HP 3000 Computer Systems

HEWLETT PACKARD

Native Language Support Reference Manual

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NATIVE LANGUAGE SUPPORT REFERENCE MANUAL

HEWLETT PACKARD
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First Edition . . . . . September 1984

MPE V MANUAL PLAN

INTRODUCTORY LEVEL:

GENERAL INFORMATION Manual 5953-7553

GUIDE FOR THE NEW USER 32033-90009 IN PROGRESS

GUIDE FOR THE NEW OPERATOR 32033-90021 IN PROGRESS

STANDARD USER LEVEL:

MPE V COMMANDS Reference Manual 32033-90006

MPE V INTRINSICS Reference Manual 32033-90007

MPE V UTILITIES Reference Manual 32033-90008

SEGMENTER Reference Manual 30000-90011

DEBUG/STACK DUMP Reference Manual 30000-90012

FILE SYSTEM Reference Manual 30000-90236

ADMINISTRATIVE LEVEL:

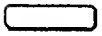
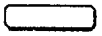
MPE V SYSTEM OPERATION & RESOURCE MANAGEMENT Reference Manual 32033-90005

SUMMARY LEVEL:

MPE QUICK REFERENCE GUIDE 30000-90048 IN PROGRESS

There are many more manuals applicable to the HP 3000. A complete list may be found in every issue of the MPE V Communicator. Please contact your System Manager.

CONVENTIONS USED IN THIS MANUAL

NOTATION	DESCRIPTION
COMMAND	Commands are shown in CAPITAL LETTERS. The names must contain no blanks and be delimited by a non-alphabetic character (usually a blank).
KEYWORDS	Literal keywords, which are entered optionally but exactly as specified, appear in CAPITAL LETTERS .
parameter	Required parameters, for which you must substitute a value, appear in ***bold italics***.
parameter	Optional parameters, for which you may substitute a value, appear in *standard italics*.
[ ]	An element inside brackets is optional. Several elements stacked inside a pair of brackets means the user may select any one or none of these elements. Example: [A] / [B] user may select A or B or neither. When brackets are nested, parameters in inner brackets can only be specified if parameters in outer brackets or comma place-holders are specified. Example: [*parm1*[,*parm2*[,*parm3*]]] may be entered as: *parm1*,*parm2*,*parm3* or *parm1*,,*parm3* or ,,*parm3* , etc.
{ }	When several elements are stacked within braces the user ***must*** select one of these elements. Example: { A } / { B } user must select A or B.
...	An ellipsis indicates that a previous bracketed element may be repeated, or that elements have been omitted.
user input	In examples of interactive dialog, user input is underlined. Example: NEW NAME? ALPHA1
superscript^{C}	Control characters are indicated by a superscript^{C}. Example: Y^{C}. (Press Y and the CNTL key simultaneously.)
	 indicates a terminal key. The legend appears inside.
** Comment **	Editor's comments appear in this form.

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PREFACE

Native Language Support (NLS) provides the HP 3000 with the features necessary to produce localized application programs for end users without reprogramming for each country or language.

Native Language Support consists of Multi-Programming Executive (MPE) intrinsics, additional features in COBOLII, and the FCOPY, IMAGE, KSAM, QUERY, SORT-MERGE, and VPLUS subsystems, the Application Message Facility, plus utilities to install and implement native language capabilities.

INTRODUCTION TO NLS

SECTION I

Hewlett-Packard Native Language Support (NLS) features enable the applications designer/programmer to create local language applications for the end user.

BACKGROUND INFORMATION

A well-written application program manipulates data and presents it appropriately for its use and user. Users who are less technically sophisticated benefit from application programs which interact with them in their native language, and which conform to their local customs. Native language refers to the user's first language (learned as a child), such as Finnish, Portuguese, or Japanese. Local customs refer to conventions such as local date, time, and currency formats.

Programs written with the intention of providing a friendly user interface often make assumptions about the local customs and language of the user. Program interface and processing requirements vary from country to country, and sometimes within a country. Much existing software does not take this into account, and is appropriate for use only in the country or locality in which it is written.

The solution to this problem is to design application programs that can be easily localized. Localization is the adaptation of a software application or system for use in different countries or local environments. In such an environment, the user's native language and/or data processing requirements may differ from those in the environment of the software developer. Traditionally, localization has been achieved by modifying a program for each specific country. Applications designed with localization in mind provide a better solution. Localization can then be accomplished with (ideally) no modification of code at all.

An applications designer must write the application program with built-in provisions for localization. Functions which are local language or custom dependent cannot be hard-coded. For example, all messages and prompts must be stored in an external file or catalog. Character comparisons and upshifting must be accomplished by external system-level routines or instructions. The external files and catalogs can be translated, and the program localized without rewriting or recompiling the application program.

Native Language Support (NLS) provides the tools for an applications designer/programmer to produce localizable applications. These tools may include architecture and peripheral support, as well as software facilities within the operating systems and subsystems. NLS addresses the internal functions of a program (e.g., sorting) as well as its user interface (messages, formats, for example).

SCOPE OF NATIVE LANGUAGE SUPPORT

HP 3000 Native Language Support (NLS) consists of features within MPE, as well as in the FCOPY, IMAGE, KSAM, QUERY, SORT-MERGE, VPLUS, and COBOLII subsystems. These facilities allow application programs to be designed and written with a local language interface for the end user, and locally correct internal processing. The end user can see localized programs produced by applications designers/programmers who have used the available NLS tools.

The MPE interface, the subsystems, programmer productivity tools, and compilers have not been localized. The applications designer must still interact with MPE and the subsystems using American English. For the designer/programmer, the interface has not changed. For example, it is possible to write a complete local language application program using COBOLII and VPLUS, but the COBOLII compiler and the VPLUS FORMSPEC program retain their English-like characteristics.

Not all functions which vary from one language to another or one country to another are provided by HP 3000 NLS. For example, tax calculation rules are usually country-specific (or even more local), and rules for word hyphenation are related to individual languages. Functions such as these are considered to be application-specific, and are beyond the scope of NLS.

SUPPORTED NATIVE LANGUAGES

NLS is based on languages and character sets which have been pre-defined and built into the operating system. These are referred to as supported languages. Hewlett-Packard has assigned a unique language name and language ID number to each language supported in NLS. Characteristics of supported native languages are documented in Appendix B, "SUPPORTED LANGUAGES AND CHARACTER SETS." In some cases, Hewlett-Packard has introduced more than one supported language corresponding to a single natural language. For example, NLS supports FRENCH (language number 7) and CANADIAN-FRENCH (language number 2). Upshifting is handled differently in FRENCH and CANADIAN-FRENCH. When language-dependent characteristics differ within the same natural language, NLS can create separate native languages to represent these differences.

Each of the supported languages may also be considered a "language family" which is applicable in several countries. GERMAN (language number 8), for example, may be used in Germany, Austria, Switzerland, and any other place it is requested. The 8-bit character sets are ROMAN8, character set 1, and KANA8, character set 2.

In addition to the native languages supported, an artificial language, NATIVE-3000 (language number 0), represents the way the computer used to deal with language before the introduction of NLS. The collating sequence (the sequence in which characters acceptable to the computer are ordered) for NATIVE-3000, for example, is simply the order of characters in the USASCII code. The NATIVE-3000 date format is that returned by the existing MPE intrinsic, FMTDATE. Whenever language number 0 is used in a native language function, the result will be identical to that of the same function performed before the introduction of NLS. NLS intrinsic calls with the language parameter equal to 0 will always work correctly, even if no native languages have been configured on the system. This list contains the language names and ID numbers (*langnum* values) available in each character set.

USASCII **(Set #0)**

Language Number	Language Name
00	NATIVE-3000

ROMAN8 **(Set #1)**

Language Number	Language Name
00	NATIVE-3000
01	AMERICAN
02	CANADIAN-FRENCH
03	DANISH
04	DUTCH
05	ENGLISH
06	FINNISH
07	FRENCH
08	GERMAN
09	ITALIAN
10	NORWEGIAN
11	PORTUGUESE
12	SPANISH
13	SWEDISH

KANA8 **(Set #2)**

Language Number	Language Name
00	NATIVE-3000
41	KATAKANA

8-Bit Character Sets

Within NLS, each supported language is associated with an 8-bit character set (one character set may support many languages). Like languages, character sets have Hewlett-Packard defined names and ID numbers assigned, although these names and numbers are not widely used, except, in documentation. Before the introduction of NLS, the only widely-supported character set was USASCII, a 128-character set designed to support American English text. USASCII uses only seven bits of an 8-bit byte to encode a character. The eighth or high order bit is always zero. For this reason, USASCII is referred to as a "7-bit" code.

An 8-bit byte has the capacity to contain 256 unique values, which means it is possible to build supersets of USASCII which permit encoding and manipulation of characters required by languages other than American English. These supersets are referred to as "8-bit" or "extended" character sets. New characters are added with code values in the range 161-254.

NLS supports three character sets:

CHARACTER SET #0, USASCII

CHARACTER SET #1, ROMAN8

CHARACTER SET #2, KANA8

Appendix B, "SUPPORTED LANGUAGES AND CHARACTER SETS" contains a list of native languages supported by each character set.

Another method of providing foreign characters (not supported by NLS) involves replacing as many as 12 existing characters in USASCII with substitution characters. The 7-bit substitution set eliminates some characters in favor of others needed by a particular local language. A different substitution set is necessary for each language. NLS 8-bit character sets support all USASCII characters (with the exception of "\" in KANA8) in addition to the characters needed to support several western European-based languages and katakana.

The use of 8-bit character sets for NLS implies that in character data, all bits of every byte have significance. Application software must take care to preserve the eighth (high order) bit, nowhere allowing it to be modified or reused for any special purpose. Also, no differentiation should be made between characters having the eighth bit turned off and those with it turned on, because all are characters of equal status in the extended character set.

Language-Dependent Characteristics

For each native language which is supported by NLS, a number of characteristics are known. These are lexical conventions (e.g., collating sequence and upshifting rules), country or local custom-dependent formats (currency symbols, date and time formats), and data processing conversion tables:

- Lexical conventions vary from country to country. The collating sequence is affected by the local alphabet and usage of each language. Upshifting tables maintained by NLS for each supported language contain the appropriate result of upshifting any character in the corresponding character set. This category of information is really language-related in the literal sense.

- Currency symbols, and date, time and number formats are country and local custom dependent. Currency symbols and their position in relation to numbers depend on local custom. Date, time and number formats also vary from country to country.

- Data processing tables for ASCII-to-EBCDIC and EBCDIC-to-ASCII conversion are affected by language because the EBCDIC codes are different from country to country.

Within NLS, characteristics that are language related, custom dependent, and data processing oriented are all considered to be language dependent. All information used by, or available from NLS is based on the application's choice of language(s). For example, NLS maintains an ENGLISH collating sequence and an ENGLISH time-of-day format. In this context, ENGLISH refers specifically to that used in England rather than the English language. (AMERICAN refers to the language, formats and tables used in the United States.)

Appendix B, "SUPPORTED LANGUAGES AND CHARACTER SETS," contains a complete list of supported languages and language characteristics. The exact information on any particular installed language is available programmatically via the NLINFO intrinsic (see Section IV, "NATIVE LANGUAGE INTRINSICS") or, in report form from the NLUTIL program.

NATIVE LANGUAGE SUPPORT IN MPE

The MPE components of NLS consist of the utility programs, LANGINST and NLUTIL, and system intrinsics, as well as an application message facility.

NLS System Utilities

LANGINST is used by system managers to select the native languages to be supported on their system(s). NLUTIL is used to obtain the details of languages installed on a system. LANGINST and NLUTIL are described in Appendix A, "SYSTEM UTILITIES."

Configuring Native Languages

Before any native languages (except NATIVE-3000) can be used on a system, they must be configured by the System Manager using the LANGINST utility program. Refer to Appendix A, "SYSTEM UTILITIES" for the LANGINST user dialogue. The System Manager can select which supported languages to configure, and can modify several formats associated with any language(s) being configured. This feature is useful, for example, to a System Manager in Austria who wants to install GERMAN with a different currency symbol than the default for this language. Changes to a system's language configuration are effective after the next system startup, at which time the configured languages are installed. After a language has been installed, language-specific information available in NLS may be used by any application program requesting it.

NLS Intrinsics

The NLS intrinsics may be called by application programs and Hewlett-Packard subsystems to provide language-dependent functions and information for any language installed on a system. For example, the NLFMTDATE intrinsic returns a locally formatted date, and the NLCOLLATE intrinsic compares two character strings using a language-dependent collating sequence. The NLS intrinsics are documented in Section IV, "NATIVE LANGUAGE INTRINSICS." Major HP 3000 subsystems call NLS intrinsics to perform certain functions. For example, configured native languages can affect the collating sequence used by SORT-MERGE, the numeric formatting done by VPLUS, and the EBCDIC conversions performed by FCOPY. Section III, "NLS IN MPE SUBSYSTEMS" contains specific information.

NOTE

None of these changes are automatic. All existing applications and jobs will work the same way they did previously when NLS is installed unless they are modified to request NLS functions.

Peripheral Support

Peripherals configured for any of the 7-bit substitution sets are not supported by NLS.

Most Hewlett-Packard peripherals are designed for 8-bit operation. Most peripherals that have been configured for 7-bit operation can be reconfigured for 8-bit operation. Refer to Appendix E, "PERIPHERAL CONFIGURATION" for instructions. Limitations and notes are listed for each

peripheral. All NLS features are available to users with 7-bit USASCII terminals and printers, provided that the data used contains only USASCII characters. For example, a user in the United States can use AMERICAN (the Hewlett-Packard name for English as it is used in the United States) for sorting, date formatting, and message handling consistent with lexical conventions and local custom formats. This is possible because USASCII is a subset of ROMAN8.

NLS has no direct control over what peripherals are configured on a system. It is, therefore, the user's responsibility to configure peripherals which support the character set(s) necessary for the desired languages.

Conversion Utilities

Data encoded according to any 7-bit substitution set is not supported by NLS. Users with data encoded in one or more of the European 7-bit substitution sets supported on the older HP terminals and printers have the option to convert this data. A set of utilities is available to convert 7-bit data to 8-bit (ROMAN8) data in KSAM files, IMAGE data bases, VPLUS forms files, and MPE files. Appendix F, "CONVERTING 7-BIT TO 8-BIT DATA," contains conversion instructions.

Application Message Facility

A localizable program contains no text (prompts, commands, messages) stored in the code itself. This allows the text to be translated (part of the localization process) without modifying the source code of a program or recompiling it. Therefore, a good text handling facility is essential to Native Language Support.

The principal tool supplied within NLS for text handling is the Application Message Facility. The application message catalog facility consists of the GENCAT utility program and the "CAT" intrinsics (CATREAD, CATOPEN, and CATCLOSE). The application message catalog facility provides efficient storage and retrieval of program messages, commands, and prompts. The GENCAT program is used to convert an ASCII source file containing messages into a binary application catalog that can be accessed by the intrinsics. Application programs use the CAT intrinsics to retrieve messages from it. An application message catalog consists of a file containing character strings (messages), each uniquely identifiable by a set number, and a message number within a set. Key features of the Application Message Facility include:

- Each message in a catalog can allow up to five parameters which may be specified by position or by number.

- An editor is used to create an MPE ASCII file which is the source catalog. The GENCAT program is used to read the source catalog and to create a formatted catalog. The formatted catalog has an internal directory for efficient access, and is compacted (by deleting trailing blanks, for instance) to optimize storage space.

- GENCAT has a facility to merge two message source files; a master file and a maintenance file. The maintenance file contains changes to be made in the master file. Updates of a localized version of an application may be made by translating the maintenance file, then merging it with the localized source file.

- Multiple localized versions of an application can be supported with translations of the original source catalog. If a naming convention is established, the application program can determine which localized catalog to open at run time (using the CATOPEN intrinsic). A suggested naming convention is discussed in Section II, "APPLICATION MESSAGE FACILITY."

The application message facility is documented in Section II, "APPLICATION MESSAGE FACILITY."

FILE NAMING CONVENTIONS

An application which has been localized into several languages will have separate message catalogs, VPLUS forms files, and/or various other language-dependent data files for each of these languages. It is suggested that a naming convention be established for these files which follows the language numbering used by NLS. To do this, a file name should be used which is up to five identifying characters followed by a three digit language number, corresponding to the language of the file contents. For example, the original, unlocalized data might be stored in a file whose name is FILE000; the FILE008 would contain the same data modified for German, and FILE012 would contain Spanish data. It is the responsibility of the application program, then, to determine at run time which file to open. (Once the language number is determined, the NLAPPEND intrinsic may be used to form the file name if this convention is followed.)

NLS IN THE SUBSYSTEMS

In addition to the new utilities and MPE intrinsics, NLS provides features in COBOLII, FCOPY, IMAGE, KSAM, QUERY, SORT-MERGE, and VPLUS. NLS features in these subsystems are intended to provide applications designers and programmers with the tools to design local language applications. The subsystems themselves are not localized. The application end user, not the programmer or subsystem user, sees the localized interface.

MPE Native Language Support intrinsics provide the means to implement NLS features of the subsystems. This means that native language definition is consistent in all the subsystems. Collating sequence is a good example of consistency within MPE and in the subsystems. The collating sequence defined for a specific native language can be used in MPE by calling the NLCOLLATE and NLKEYCOMPARE intrinsics. The same collating sequence is used by SORT-MERGE in ordering records, by KSAM in ordering keys, and by IMAGE in ordering sorted chains when these subsystems are dealing with sorted character strings that have been associated with the same native language.

The MPE operating system and its subsystems function independently of native language features configured on the system. NLS features are optional, and must be requested to be invoked. This means that existing application software and stream files will operate as they did before the introduction of NLS.

ACCESSING NLS FEATURES

On HP 3000 systems using MPE and subsystems with NLS features, all NLS features are optional. These features must be requested by the applications programmer through intrinsic calls or interactively by the user of a subsystem program through a LANGUAGE command or keyword.

Intrinsics

One way of getting (optional) NLS features from application programs is through calls to specific NLS intrinsics, primarily in MPE. Thus, to get a local language date format, an application should call the new NLFMTDATE intrinsic instead of the old FMTDATE intrinsic (which is unchanged).

Additional Parameter Values In Existing Intrinsics

Another way is by specifying values for extended or new parameters in existing intrinsics. For example, SORTINIT in SORT-MERGE has been extended to allow the specification of a CHARACTER key, and a native language ID number (*langnum*) which determines the collating sequence to be used. These additional parameters must be used in an application to sort according to native language values.

Native Language Attribute

Some subsystem structures, including IMAGE data bases, KSAM files, and VPLUS forms files may be assigned a language attribute by their creators. The language attribute will ensure that certain functions will perform according to localized specifications at run time. VPLUS, for example, will perform its upshift function according to the language of the forms file.

Commands

Commands or keywords have been added to certain subsystems which make NLS features available on request. For example, entering LANGUAGE=FRENCH within QUERY would cause sorted character data of IMAGE types X and U to be sorted according to the FRENCH collating sequence in its output reports. If the language command is not entered, QUERY (or any other subsystem) will perform as it did before the introduction of NLS. If these commands are not used, the default language(s) used by subsystem utility programs can be influenced by the values of the two NLS Job Control Words, NLUSERLANG and NLDATALANG.

Some general suggestions for designing applications incorporating NLS features, and specific strategies for using major programming languages are included in Appendix G, "APPLICATION GUIDELINES."

Information on how and when the individual subsystems are influenced is included in Section III, "NLS IN MPE SUBSYSTEMS."

IMPLICIT LANGUAGE CHOICE IN SUBSYSTEMS

Two NLS Job Control Words (JCWs), NLUSERLANG and NLDATALANG, permit the subsystem user to designate a default language other than NATIVE-3000 for the subsystems. Each of the five subsystem programs (SORT, MERGE, FCOPY, QUERY, ENTRY) looks at one of these JCWs, and its value is used as a default language by the program. The default can be superseded by a specific command. Utility programs in the subsystems are often run within user-defined commands (UDCs). UDCs are often created for the convenience of a less sophisticated computer user than the person who designed them. To add to this convenience, NLS has established a convention for designating the native language choice for operation of the subsystem programs that does not require the user to enter a language explicitly. This is accomplished through the use of two reserved Job Control Words (JCWs), NLUSERLANG and NLDATALANG:

- NLUSERLANG designates the user interface (and report output) language for programs. If the subsystems were localized (which they aren't), this would be the language of choice for prompts and messages. If user input data is modified, (for example, upshifted by QUERY or VPLUS) this language determines which language's attributes are used. NLUSERLANG designates the default language for all language-dependent operations in QUERY and ENTRY.

- NLDATALANG designates the internal data manipulation language. One of the reasons that this is distinct from NLUSERLANG is the possibility that multiple users with different interface languages may wish to share some common internal data which is, for example, sorted according to one language. The data manipulation language is used in the SORT, MERGE, and FCOPY programs to control their language-dependent functions, such as collating, upshifting, and conversions to and from EBCDIC. Note that if the user interface of one of these programs were localized, which it isn't, it would use NLUSERLANG as its default for messages, prompts, etc.

  NLUSERLANG and NLDATALANG are independent JCWs, and are treated independently by NLS. In many cases, of course, they will specify the same language, but examples already exist in which they could have been used with distinct values. One example is the HPWord product, which has the concepts of a user language and a document language.

The NLGETLANG Intrinsic

NLUSERLANG and NLDATALANG values are retrieved by the subsystems through calls to the NLGETLANG intrinsic. Application programs may also wish to use this intrinsic. NLGETLANG retrieves the value of the language attribute requested, and verifies that it is installed. If the value is that of an unconfigured or undefined language, NLGETLANG will return a language ID number of 0 (NATIVE-3000) and an error. To use either JCW, set the integer value corresponding to the language ID number desired, using :SETJCW. The MPE V Commands Reference Manual (32033-90006), lists the :SETJCW command syntax.

User-Defined Commands (UDCs)

ENTRY, FCOPY, QUERY, SORT and MERGE are often run from within user-defined commands (UDCs). The two NLS Job Control Words (JCWs) give the user the option of establishing a native language within a UDC.

APPLICATION PROGRAMS

The focus of HP 3000 NLS is the application program. Most NLS tools are accessed programmatically from applications according to the requirements of the designer or programmer. Several common application models are possible. These are illustrated in Figures 1-1 to 1-5. NLS capabilities can be used in single language applications, multilingual applications, in subsystem utility programs, or not at all.

General Application Program

The functions language can influence in an application in terms of data manipulation (internals) and user interaction (externals) is illustrated in Figure 1-1. The core application program is flanked by functions that can differ according to language and local customs (local date, time, and currency formats).

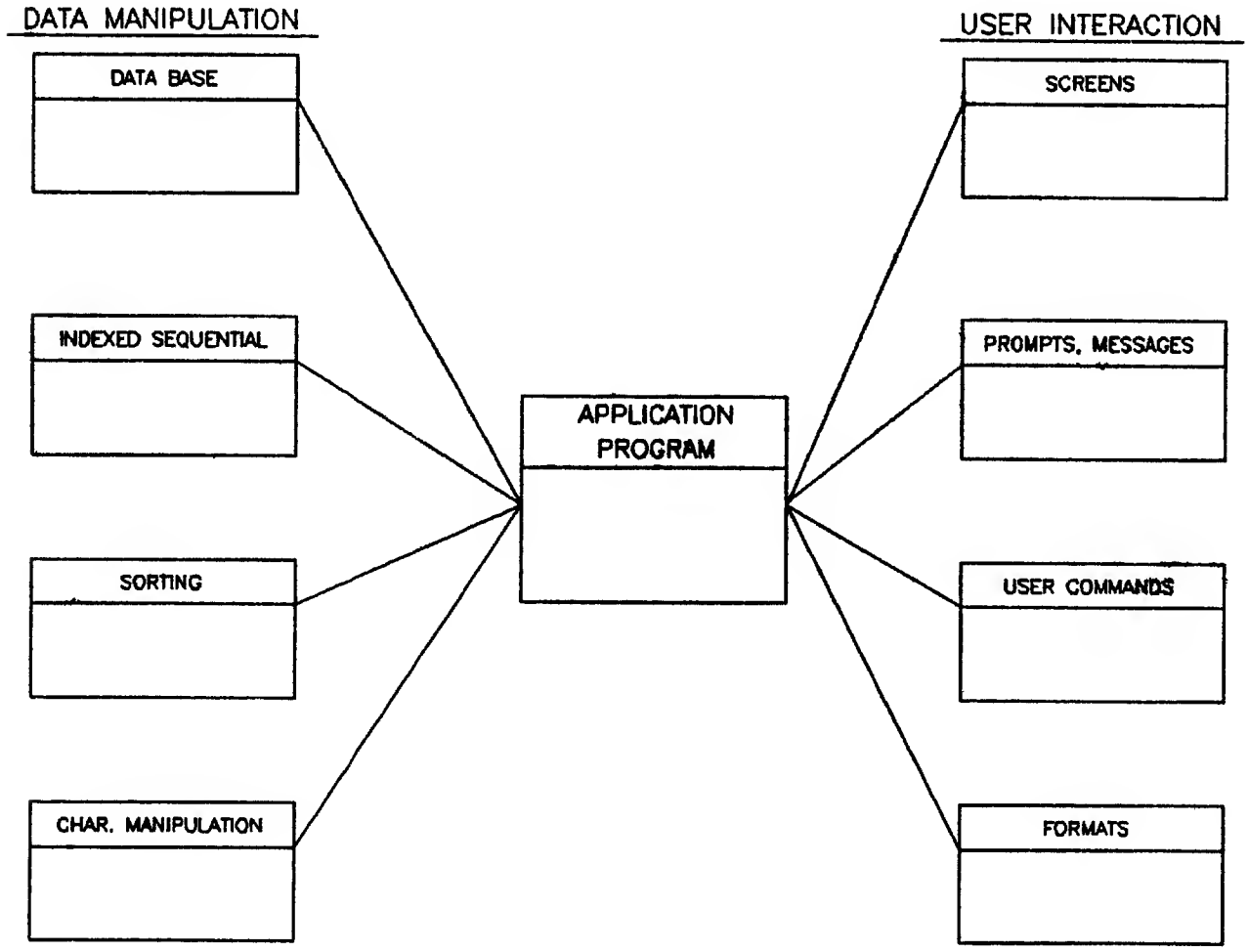


Figure 1-1. Application Program Format

Application Program Without NLS

Figure 1-2 shows an application program which does not make use of NLS capabilities. This NATIVE-3000 application makes use of conventional programming techniques and standard MPE and subsystem features to achieve the key language-dependent functions. It cannot be localized without reprogramming and is unaffected by the introduction of NLS.

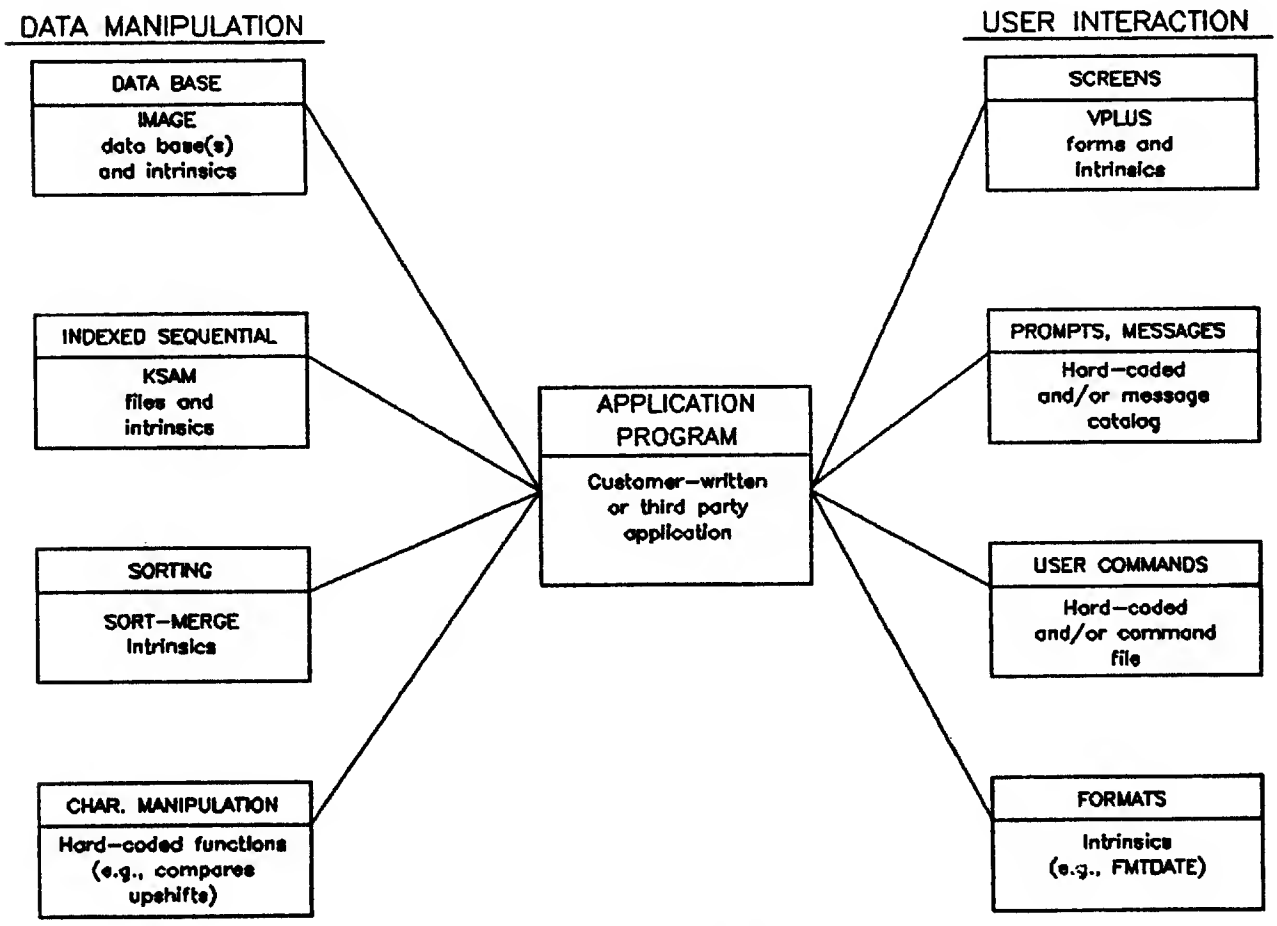


Figure 1-2. Application Program Without NLS

Single Language Application

French is used as the single language application example in Figure 1-3. The applications designer has determined that only French is required, and has hard-coded its language ID number (*langnum*) 7 into the program. The *langnum* is used as a parameter in calling various native language-dependent intrinsics. In addition, the designer has created IMAGE data bases, KSAM files, and VPLUS forms files with the French language attribute, and has expressed all prompts and messages in French. This use of NLS is for programs which will only be used in one country or location, or with only one language.

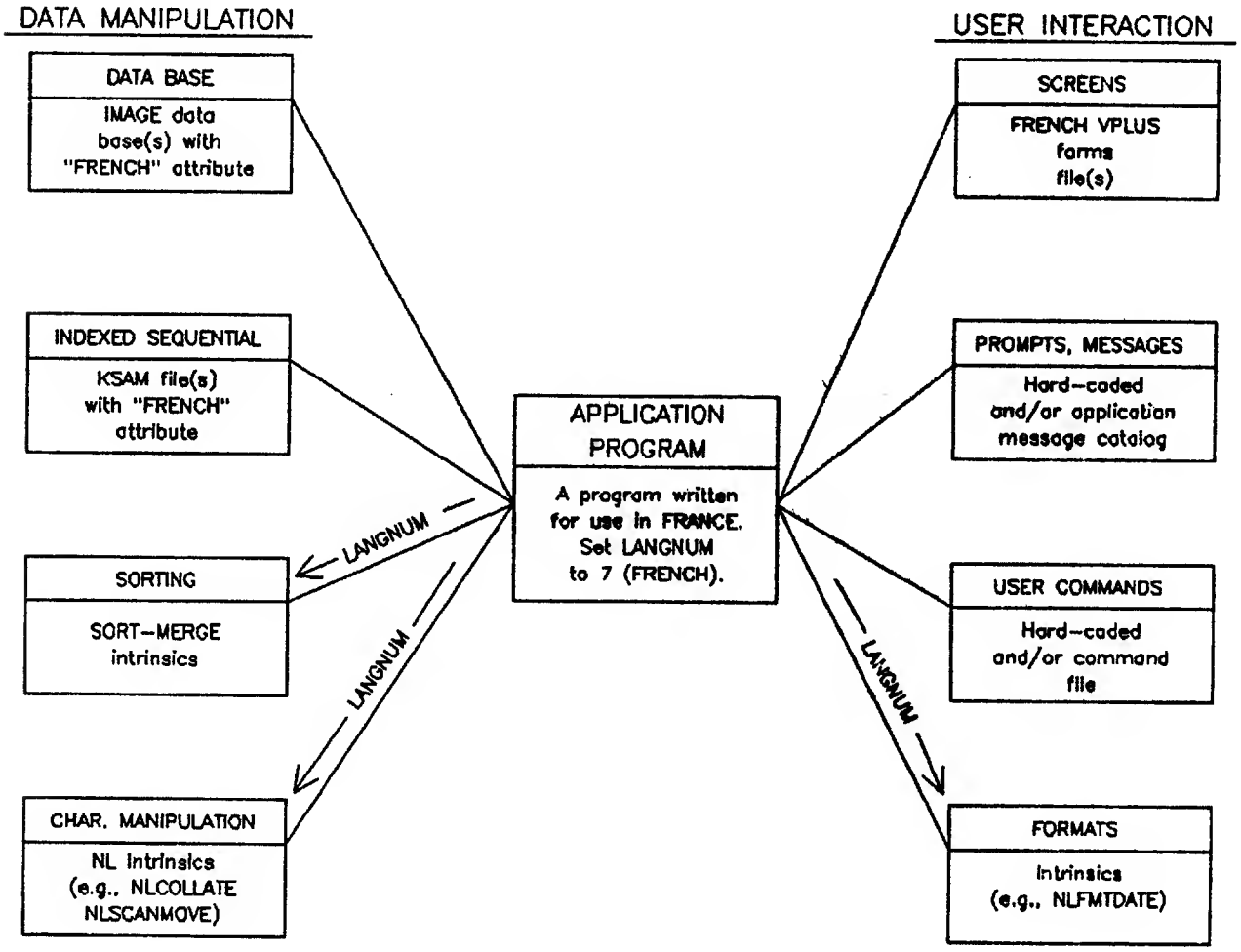


Figure 1-3. Single Language Application

Multilingual Application

The program in Figure 1-4 shows a localizable or multilingual application. This application can be used in several countries or in multiple languages by different users on the same system. The key attribute of this program is that it selects its language(s) at run time.

When installing an application on a system, the manager of the application may establish configuration file(s) for that application. These files store information about various users or transactions and

their native language requirements. At run time the application program can determine which language(s) to use.

The program may call the NLGETLANG intrinsic to obtain the system default language, (which can be set by the System Manager when native languages are configured) or it may prompt the user to enter a language name or ID number (*langnum*).

The application may call NLGETLANG to obtain the user interface language and/or the data manipulation language. The Job Control Words NLUSERLANG and NLDATALANG must be in place before invoking this type of application. This method could be too restrictive if many users or transactions are handled from one job or session.

Once the languages have been determined, the program opens the appropriate VPLUS forms files, message catalogs, and/or command files, based on the user interface language choice. It also opens any needed IMAGE data bases, KSAM files, or general data files; these may or may not depend upon language choice. The appropriate language ID numbers are used in calling the various native language intrinsics. Different users may concurrently run the same program with different languages. The application can be designed to use more than one language within a single execution. For example, one language may be used for data manipulation and a different one for user interactions.

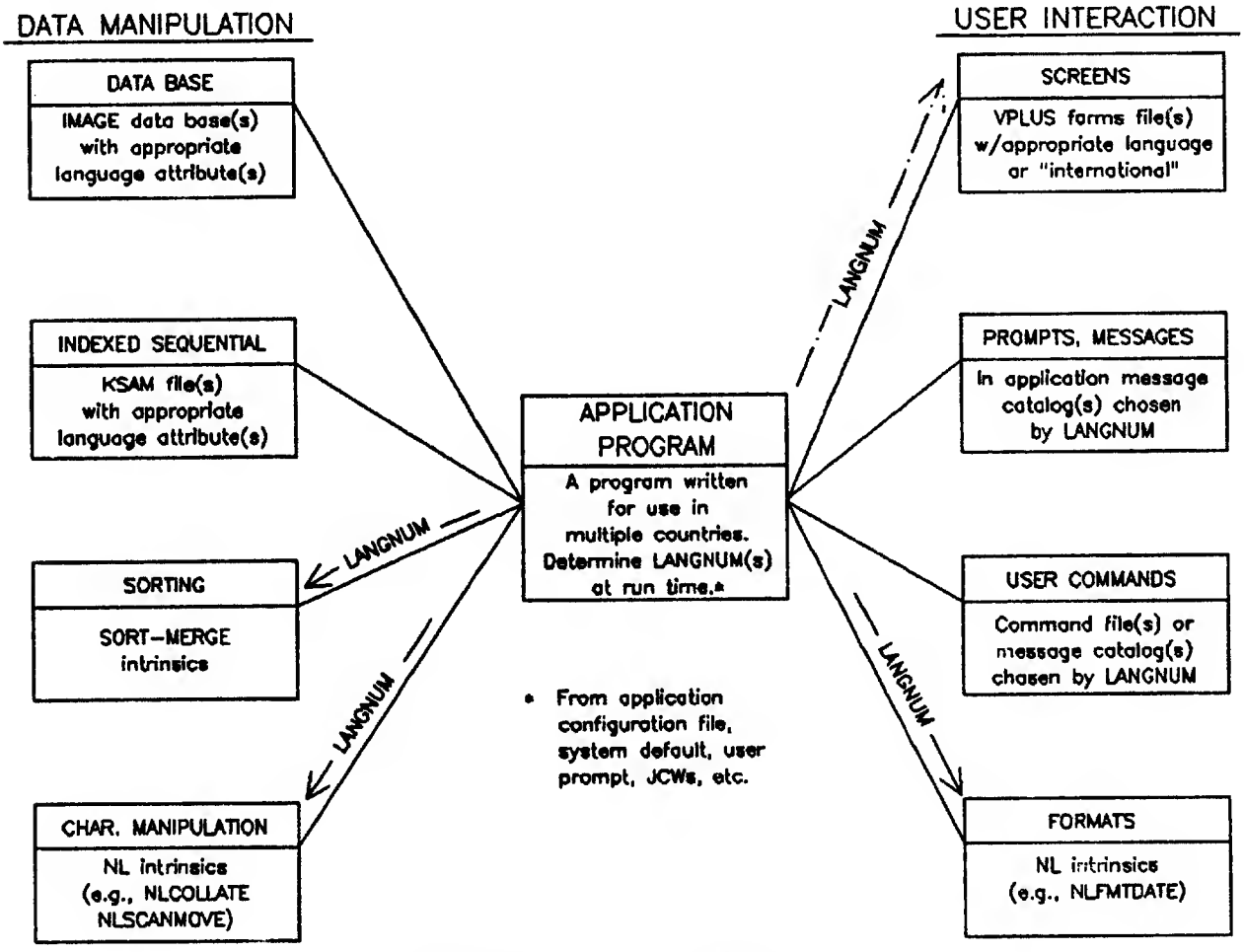


Figure 1-4. Multilingual Application

HP Subsystem Utility Program

Figure 1-5 shows a special category of multilingual application, the Hewlett-Packard subsystem utility program. Many of these programs are not typically used by end users, but are used to manipulate user data in conjunction with application programs. They determine which language to use at run time via a user-entered keyword or command, or via defaults.

The user interaction in these programs has not been made localizable since many of these programs are not end user tools.

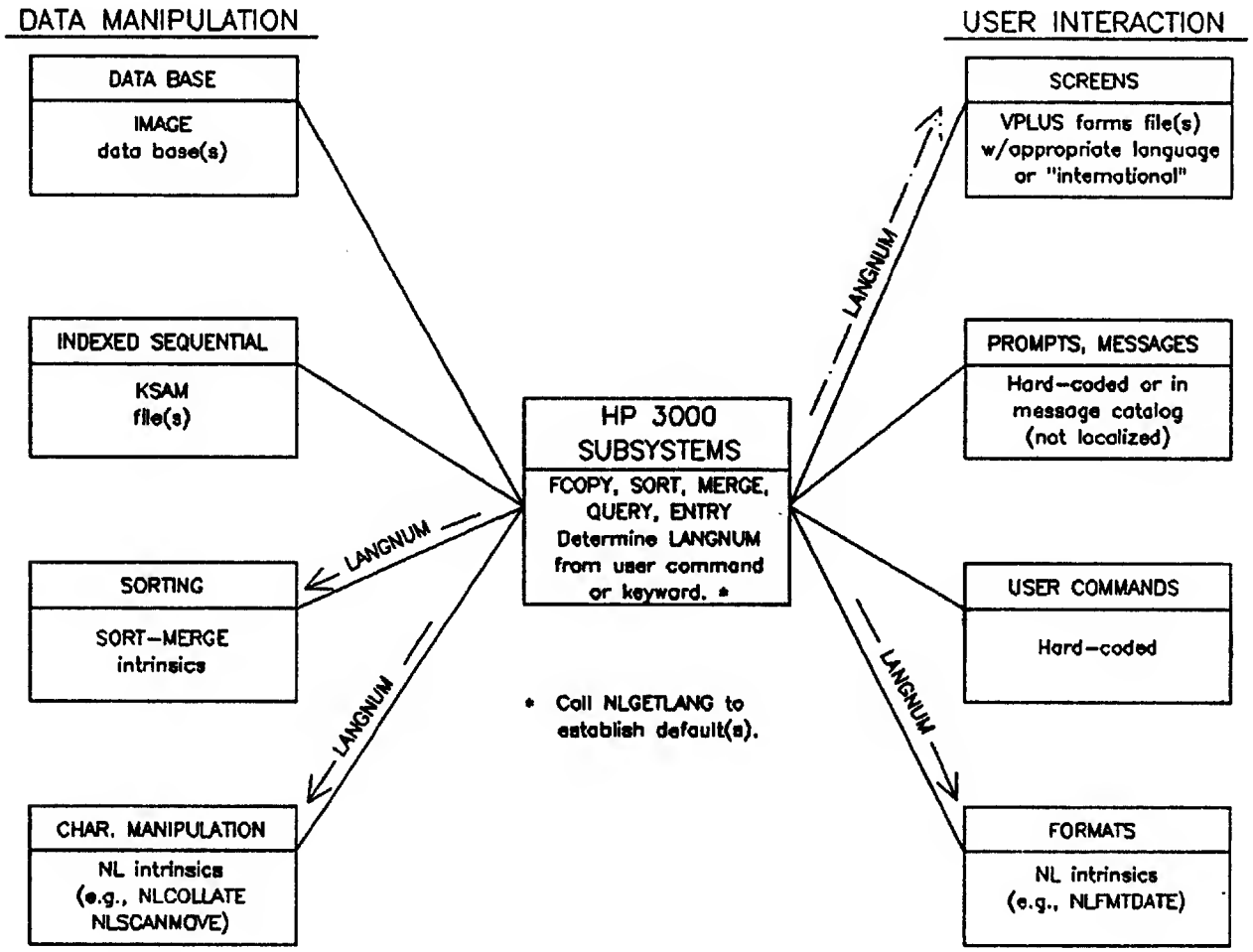


Figure 1-5. HP Subsystem Utility Program

APPLICATION MESSAGE FACILITY

SECTION II

The Application Message Facility is a Native Language Support (NLS) tool that provides a programmer with the flexibility needed to create application catalogs for localized applications. Text such as prompts, commands, and messages intended for the user's interaction with an application can be stored in separate ASCII editor files. This allows the programmer to maintain files and localize applications without changing the program code.

The NLS Application Message Facility contains the GENCAT utility program and the CAT intrinsics, CATOPEN, CATREAD, and CATCLOSE, as shown in Figure 2-1.

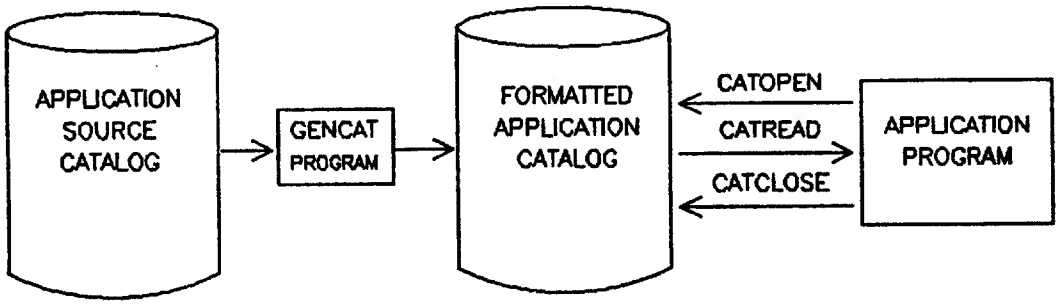


Figure 2-1. GENCAT Utility Program

The GENCAT utility creates and maintains message catalogs which meet the NLS requirements for efficient storage and retrieval of messages. For a comparison of GENCAT and MAKECAT, an MPE utility which is also used to create and maintain message catalogs, refer to Table 2-2.

ACCESSING APPLICATION CATALOGS

Catalogs formatted with GENCAT can be accessed by applications via the CAT intrinsics:

CATOPEN - Opens a catalog for access by an application.

CATREAD - Retrieves text from a catalog.

CATCLOSE - Closes a catalog.

The NLAPPEND intrinsic can be called to concatenate the language ID number and the catalog file name before the catalog is opened. Refer to "CATALOG NAMING CONVENTION" in this section for more information.

The intrinsics are documented in Section IV, "NATIVE LANGUAGE INTRINSICS." Refer to Program L in Appendix H for an example of their use.

SOURCE CATALOGS

First, the user creates an MPE ASCII file in an editor with an EDIT/3000 compatible format. The catalog may contain 8-bit characters. The GENCAT program reads the source catalog and creates a binary formatted catalog which can be accessed by application programs. Calls to the CAT intrinsics access the formatted catalogs. An internal directory is created in the formatted catalog which expedites accessing the catalog. The text in the formatted catalog is compressed for efficient storage. The source catalog's record size may vary from 20 words to 128 words. Often, a message is split over several records.

Figure 2-2 illustrates the three functions GENCAT performs on an application message catalog: modifying, formatting and expanding.

DIRECTIVES

A source catalog contains directives which partition information in the message catalog. The three types of directives include $ to denote a comment line, $SET to mark the beginning of a new set of messages, and message numbers to indicate messages.

$SET Records

A $SET record initiates a logical grouping of messages. Sets break the catalog into manageable segments containing logical groupings of messages (e.g., one set of messages for prompts, one set for instructions, one set for error messages).

The format of a $SET record, where *xxx* is a required number for that set of messages (ranging from 1 to 255) is:

```
$SET xxx  [comment] $set xxx  [comment].
```

A $SET record can contain comment as an optional character string. If there is not at least one blank between *xxx* and the comment, GENCAT will issue an error message and terminate the formatting.

Set records must begin in column 1. For example, to indicate that set number 1 is being defined:

```
$SET 1 Set one contains all prompts.
```

See Figure 2-3 for an example of a $SET record.

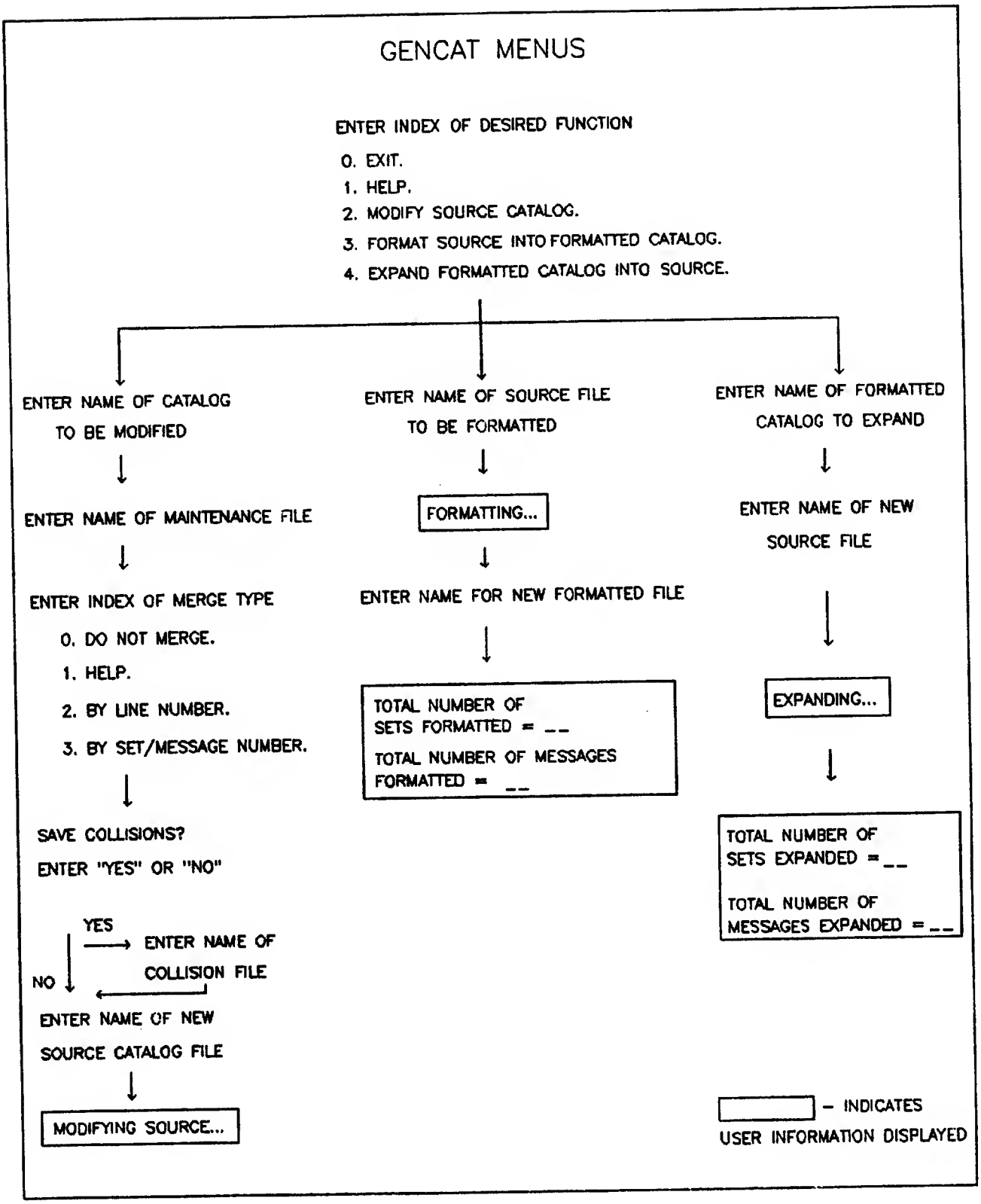


Figure 2-2. GENCAT Functions

Message Records

Message records consist of a message number followed by the message text. This may be an error message, prompt, or any text which may change with the language or country where the program will be used. Message records:

- Identify message locations within a set.
- Must be in ascending sequence and unique within the set that contains them.
- Do not need to be consecutive.

For example, within a set, one can have messages 1-25, 101, 300-332, and 32766. All of these message numbers can be used again in another set. The format for a message record where *xxxxx*, an integer, is the required message number is:

xxxxx [the text of the message].

Text is an optional character string which, if present, follows the message number. If the text is not preceded by a blank, GENCAT will replace the character immediately following the message number with a blank. The user will be informed that a blank has replaced the character. An exception is made if one of two special characters, "%" or "&," follow the message number. These characters will not be replaced by a blank. Their meaning is explained in the following section.

Message Record Special Characters

When CATREAD is writing a message to a file, the percent (%) instructs CATREAD to post a carriage return-line feed before writing the next record. For example, a message in set 4:

```
3 AN ERROR OCCURRED DURING THE LOADING %
OF THE DATA BASE.
```

The execution of `CATREAD (cat index,4,3);` results in a display of:

```
AN ERROR OCCURRED DURING THE LOADING
OF THE DATA BASE.
```

The ampersand (&) indicates that the statement is continued on the next line. Message 98 in set 67 is:

```
98 THE NUMBER OF FILES &
DOES NOT MATCH THE &
SYSTEM'S CALCULATIONS.
```

The execution of `CATREAD (cat index,67,98, ...);` results in a display of:

```
THE NUMBER OF FILES DOES NOT MATCH THE SYSTEM'S CALCULATIONS.
```

Note the use of blanks as separators preceding the ampersand. Message records must begin in column 1 and may have leading zeros. For example, the format of message number 3 in some set is:

```
0003 PLEASE ENTER YOUR NAME.
```

The tilde (~) is used as a literal character. It instructs CATREAD to treat the character which follows it as a literal part of the message (even if it is a special character). For example, two tildes in a row will put one tilde into the message.

The exclamation mark (!) is discussed in "PARAMETER SUBSTITUTION" in this section.

Comment Records

Comments are used throughout the catalog to document sets and messages, and to make them easier to read. The format of a comment record, where comment is an optional string of characters is:

$[*comment*].

A blank between $ and [*comment*] is necessary only when the comment is a $SET or $DELSET record.

Sample Source Catalog

Notice the directives $, ($SET numbers), message numbers, message comments, and the use of blanks in the sample source catalog in Figure 2-3.

```
$ This catalog is for development only.  Messages will be
$ added as needed.
$**
$SET 1  Prompts
1 ENTER FIRST NAME
2 ENTER LAST NAME
$
$**
$SET 2  Error messages
1 NAME NOT ON DATA BASE
2 ILLEGAL INPUT
95 OPERATION IS %
INCONSISTENT WITH ACCESS TYPE
$
```

Figure 2-3. Sample Source Catalog

PARAMETER SUBSTITUTION

Parameter substitution can often be used with messages. An exclamation mark (!) is used within a message to indicate where a parameter is to be inserted using CATREAD. The user must choose positional or numerical parameter substitution. Mixing these two types within a message is not allowed.

Positional Parameter Substitution

Positional parameter substitution simply means that each of the parameters in the CATREAD parameter list is to be inserted into the message at each successive "!". A maximum of 5 parameter substitutions is allowed in one message. The example in Figure 2-4 will be used to illustrate the use of positional parameter substitution.

```
SPL STATEMENT

CATREAD (catindex, 13, 400, error,,,user, term);

PARAMETERS

BYTE ARRAY user (0:8):="MARY.KSE", 0;
BYTE ARRAY term (0:5):="THREE", 0;
```

Figure 2-4. Positional Parameter Substitution

Message 400 in set 13 is:

```
400 ILLEGAL INPUT FROM USER ! ON TERMINAL NUMBER !
```

The execution of the SPL statement in Figure 2-4, with the parameters given, results in the following message:

```
ILLEGAL INPUT FROM USER MARY.KSE ON TERMINAL THREE.
```

Numerical Parameter Substitution

Numerical parameters allow the user to decide where the parameters are to be placed within the message. The exclamation mark (!) is immediately followed by a number in the range 1-5. The example in Figure 2-5 will be used to illustrate the use of numerical parameter substitution.

```
SPL STATEMENT

CATREAD (catindex, 7, 4, error,,,fourstr, fivestr)

PARAMETERS

BYTE ARRAY fourstr (0:4):="FOUR", 0;
BYTE ARRAY fivestr (0:4):="FIVE", 0;
```

Figure 2-5. Numerical Parameter Substitution

A message in set 7 is:

```
4 EOF DETECTED AFTER RECORD !1 IN FILE !2
```

The execution of the SPL statement in Figure 2-5, with the parameters given, results in the following message:

```
EOF DETECTED AFTER RECORD FOUR IN FILE FIVE.
```

Message 5 in set 7 is:

```
5 EOF DETECTED AFTER RECORD !2 IN FILE !1
```

A change in the call results in a different message:

```
CATREAD (catindex, 7, 5, error,,,fourstr, fivestr)
```

Message:

```
EOF DETECTED AFTER RECORD FIVE IN FILE FOUR.
```

Mixing numerical and positional parameter substitution characters is not allowed and will be flagged as an error:

```
EOF DETECTED AFTER RECORD ! IN FILE !1.
```

Numeric parameter substitution can be used only with GENCAT and the CATREAD intrinsic. CATREAD interprets the character tilde (~) as a literal character. If a character is preceded by a tilde (~), that character is taken literally. For example, if set 7 also contains the following message:

```
6 ERROR ! IN INPUT~!
```

When the SPL statement, `CATREAD (catindex,7,6,error,,,seventeen)`, is executed, the resulting output is:

```
ERROR 17 IN INPUT!
```

The second exclamation mark would not be used for parameter substitution because it is preceded by a "~".

CATALOG NAMING CONVENTION

Catalogs are MPE files accessed by application programs via the CAT intrinsics. An application that has been localized into more than one language will typically have a separate message catalog for each language. A naming convention facilitates using different localized versions of files required by an application program.

A catalog file name can be identified with a maximum of five characters. Each native language supported by NLS has a language ID number (*langnum*). A three-digit language ID number can be appended to the catalog file name to identify each localized catalog.

For example, an original unlocalized message catalog is APCAT000. The message catalog in German would be APCAT008. A Spanish version would be APCAT012. Refer to Appendix B, "SUPPORTED LANGUAGES AND CHARACTER SETS," for a complete list of native languages and their corresponding language ID numbers. When the language ID number has been selected, the NLAPPEND intrinsic may be used to form the catalog file name. At run time the application program is responsible for determining which catalog to open with the CATOPEN intrinsic.

MAINTAINING A MESSAGE CATALOG

Maintenance functions can include addition, deletion, and modification of records in the source file. The input for merging consists of two files, the source file and the maintenance file. The maintenance file is merged against the source file, either by line numbers or by $SET and message numbers. If the user does not know the line numbers, the $SET and message numbers can be used successfully. The context of the $SET and message records in the maintenance file determines the type of maintenance performed on the source. Changes made to a source during a maintenance merge may be kept in a collision file named by the user. Collision files are created at the option of the user. Figure 2-6 illustrates how the collision file may be merged against the modified source catalog to re-create the original source.

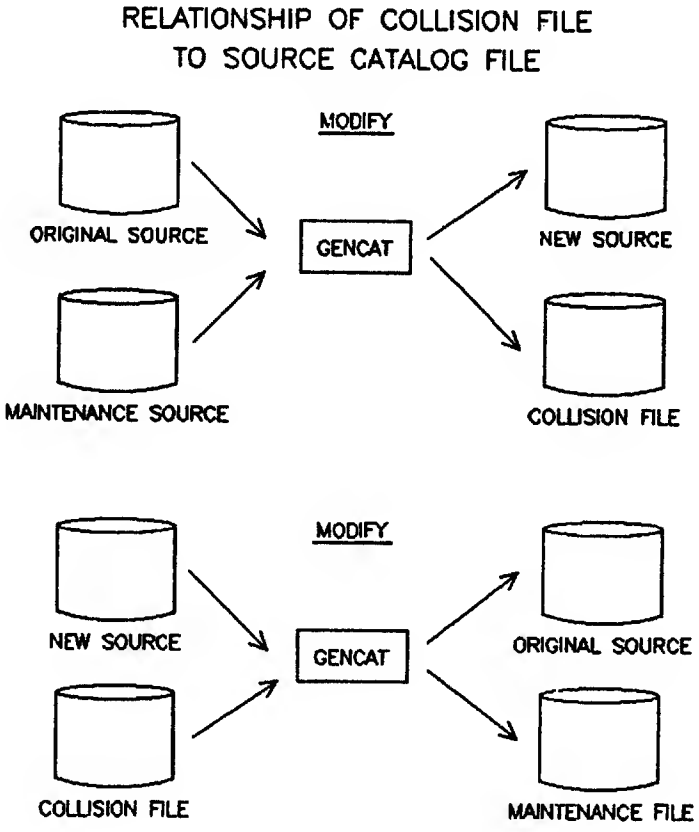


Figure 2-6. Collision Files

Merging Maintenance Files by Line Numbers

Merging a maintenance file against a source catalog file by line numbers may include modifying, adding or deleting records.

MODIFYING A RECORD. If the maintenance file's line number is common to the source file's, the source's record is overwritten by the maintenance record.

ADDING A RECORD. If the line number in the maintenance file does not exist in the source, the record represented by that line number from the maintenance file is added to the source at that line number.

DELETING A RECORD. The directives $EDIT and $EDIT VOID=XXXXXXXX are used to delete records from the source file. If $EDIT VOID is used, the records beginning with and including the record number of the $EDIT VOID record to record XXXXXXXX are deleted. The line number XXXXXXXX represents the line number XXXXX.XXX of the source file.

Merging Maintenance Files by $SET and Message Number

When GENCAT reads a $SET record from the maintenance file, all records following the $SET record are considered to be message records or comment records within that set until GENCAT reads another $SET record or exhausts the maintenance file. Set numbers must be in ascending order, and all message numbers must be in ascending order within each set.

The first record GENCAT expects to read from the maintenance file is a $SET, $DELSET (Refer to "THE $DELSET DIRECTIVE" discussion in this section.), or a comment record. GENCAT will continue to read and evaluate the maintenance file records until there is an error or the maintenance file is exhausted. After GENCAT reads a maintenance file record, it is evaluated according to a set of rules, and a copy of the source is modified as necessary. The following rules for evaluation apply to set numbers and message numbers.

SET NUMBERS. New message numbers and set numbers are added to the source catalog file. All message numbers and messages following this set record are assumed to be new, and will be added to the source file.

Set numbers, if already present, signify changes to the set of messages currently in the source catalog. All message numbers and messages following this set are to be evaluated according to the rules for message numbers.

Set numbers in a $DELSET record mean that the entire set of messages in the source is to be deleted.

MESSAGE NUMBERS. New message numbers within a $SET are added to the new source. Message numbers that are already present are deleted if no text follows the message number. If new text is supplied, the existing message will be updated.

COMMENT RECORDS. Comment records are written to the new source file as they are encountered, either in the source or the maintenance file.

THE $DELSET DIRECTIVE. The $DELSET directive is allowed only in the maintenance file. It instructs GENCAT to delete the entire set of messages denoted by *xxx*. Optional text may follow *xxx*, providing it is preceded by at least one blank. The $DELSET directive is not written to the new file.

$DELSET records must begin in column 1. The format of a $DELSET record, where *xxx* is an existing set number in the source catalog is:

$DELSET *xxx* [*text*].

The directives $SET and $DELSET may be either in uppercase or lowercase (**$set** and **$delset**). Mixed cases are not allowed (e.g., $Set or $deLseT).

User Dialogue

The user may modify a source file, format a source catalog, or expand a formatted catalog as shown in Figure 2-7. The process of maintaining a GENCAT source file is shown in Figure 2-8.

```
To modify a source file, enter:

:RUN GENCAT.PUB.SYS

HP32414A.00.00 GENCAT/3000 (C) HEWLETT-PACKARD., 1983

 ENTER INDEX OF DESIRED FUNCTION

 0.  EXIT.
 1.  HELP.
 2.  MODIFY SOURCE CATALOG.
 3.  FORMAT SOURCE INTO FORMATTED CATALOG.
 4.  EXPAND FORMATTED CATALOG INTO SOURCE.

>>2

ENTER NAME OF CATALOG SOURCE FILE TO BE MODIFIED

>>APCAT000

ENTER NAME OF MAINTENANCE FILE

>>CATMANNT
```

Figure 2-7. Dialogue For Modifying A Source File (1 of 2)

If the name of a nonexistent file is entered, an error message is displayed.

```
NONEXISTENT PERMANENT FILE (FSERR 52)

EXPECTED AN EXISTENT FILE AS INPUT (GCERR 15)
```

The prompt will then be repeated:

```
ENTER NAME OF MAINTENANCE FILE

>>CATMAINT

ENTER INDEX OF MERGE TYPE

0.  DO NOT MERGE.
1.  HELP.
2.  BY LINE NUMBER.
3.  BY SET/MESSAGE NUMBER.

>>3
```

Entering an "0" or RETURN aborts the maintenance function and returns to the main menu.

The user has the option of saving all the modifications resulting from the merge in a collision file.

```
SAVE COLLISIONS?  ENTER "YES" OR "NO"

>>YES

ENTER NAME OF COLLISION FILE

>>COLCAT
```

If the name of an existing file is entered, the prompt is repeated. A RETURN continues the merging without saving the collisions.

GENCAT merges the source and maintenance files into a temporary file, and will prompt for the name of a permanent file:

```
ENTER NAME OF NEW SOURCE CATALOG FILE

>>NEWCAT
```

This prompt is repeated until a unique file name or a RETURN is entered. The temporary file is copied to the new permanent file. If a RETURN is entered the merging is aborted.

Figure 2-7. Dialogue For Modifying A Source File (2 of 2)

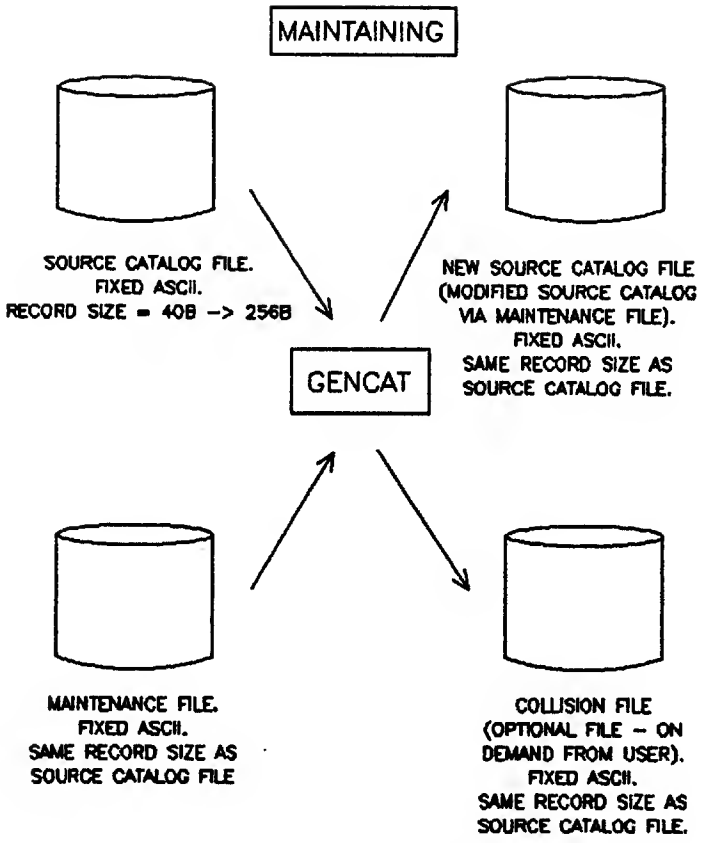


Figure 2-8. Maintaining A GENCAT Source File

FORMATTING A SOURCE CATALOG

It is necessary to format the source catalogs so the CAT intrinsics can access them. GENCAT formatted files are binary, and cannot be edited. Formatting compacts files and creates a directory, which saves disc space and reduces access time.

During the formatting process, GENCAT verifies that:

- All directives are legal and used correctly.
- Set numbers are in ascending order.
- Set numbers are greater than 0 and less than or equal to 255.
- Message numbers are in ascending order within each set.
- Message numbers are greater than 0 and less than or equal to 32766.
- Continuation and concatenation characters are correct.
- Parameter substitution characters are used correctly.

The dialogue listed in Figure 2-9 is an example of formatting a source catalog.

```
:RUN GENCAT.PUB.SYS

HP32414A.00.00 GENCAT/3000 (C) HEWLETT-PACKARD., 1983

ENTER INDEX OF DESIRED FUNCTION

    0.  EXIT.
    1.  HELP.
    2.  MODIFY SOURCE CATALOG.
    3.  FORMAT SOURCE INTO FORMATTED CATALOG.
    4.  EXPAND FORMATTED CATALOG INTO SOURCE.

>>3

ENTER NAME OF SOURCE FILE TO BE FORMATTED

>>NEWCAT

FORMATTING...

ENTER NAME FOR NEW FORMATTED FILE

>>FORMCAT

TOTAL NUMBER OF SET FORMATTED = 6
TOTAL NUMBER OF MESSAGES FORMATTED = 167

FORMATTING SUCCESSFUL
```

Figure 2-9. Source Catalog Formatting Dialogue

EXPANDING A FORMATTED CATALOG

GENCAT contains a function to re-create the original source catalog file by expanding the formatted catalog. The result is a new source catalog that can be edited, then converted to a formatted catalog. Figure 2-10 is an example of the user dialogue for expanding a formatted catalog. Figure 2-11 illustrates the relationship of formatted files to expanded files.

```
:RUN GENCAT.PUB.SYS

HP32414A.00.00 GENCAT/3000 (C) HEWLETT-PACKARD., 1983

ENTER INDEX OF DESIRED FUNCTION

    0.  EXIT.
    1.  HELP.
    2.  MODIFY SOURCE CATALOG.
    3.  FORMAT SOURCE INTO FORMATTED CATALOG.
    4.  EXPAND FORMATTED CATALOG INTO SOURCE.

>>4

ENTER NAME OF FORMATTED CATALOG TO EXPAND

>>FORMCAT

ENTER NAME OF NEW SOURCE FILE

>>NCATSOUR

EXPANDING...

TOTAL NUMBER OF SETS EXPANDED = 6
TOTAL NUMBER OF MESSAGES EXPANDED = 167

EXPANSION SUCCESSFULLY COMPLETED
```

Figure 2-10. Expanding a Formatted Catalog

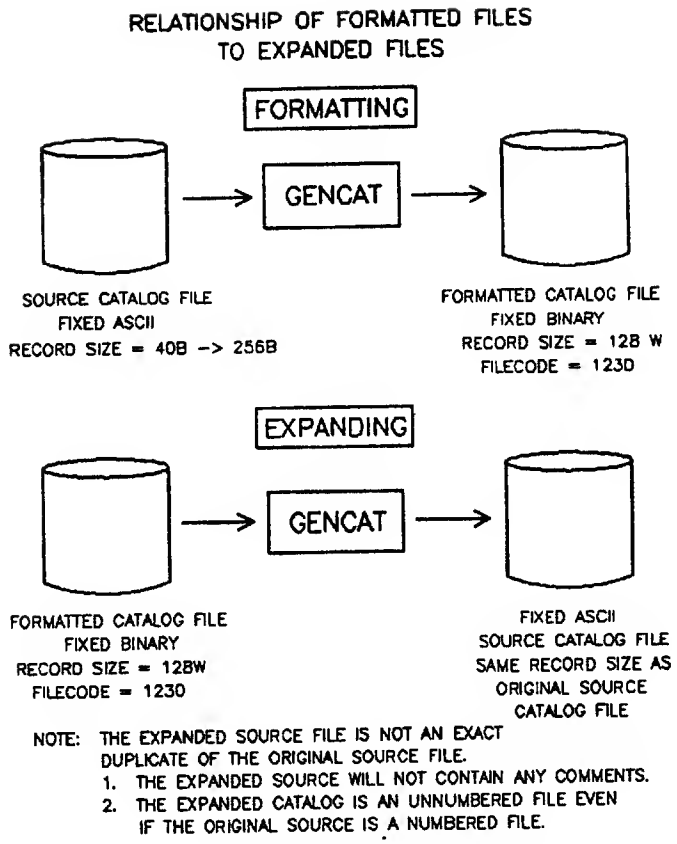


Figure 2-11. Formatting/Expanding GENCAT Source Files

GENCAT JCWs

GENCAT sets one of three specific Job Control Words (JCWs) at the conclusion of a maintenance, formatting or expansion process: GCMAINT, GCFORMAT, or GCEXPAND. If the process completes successfully, the appropriate JCW is set to zero (e.g., GCFORMAT is set to FATAL if a format failed). If the process terminates unsuccessfully, the JCW is set to FATAL.

GENCAT IN BATCH MODE

GENCAT can be invoked interactively or in batch mode. GENCAT will abort a job in batch mode if an error is encountered while formatting, expanding, or modifying.

GENCAT HELP FACILITY

GENCAT has an online HELP facility. The user can enter the index number for HELP from the menu or a "?" in response to any prompt that does not have a menu selection for HELP. See Figure 2-12 for an example of the GENCAT HELP Facility dialogue.

```
:RUN GENCAT.PUB.SYS

HP32414A.00.00 GENCAT/3000 (C) HEWLETT-PACKARD., 1983

ENTER INDEX OF DESIRED FUNCTION

    0.  EXIT.
    1.  HELP.
    2.  MODIFY SOURCE CATALOG.
    3.  FORMAT SOURCE INTO FORMATTED CATALOG.
    4.  EXPAND FORMATTED CATALOG INTO SOURCE.
>>1

This is the driver menu for GENCAT.

Input consists of a numeric index, 0 through 4.  Each index denotes
a function for GENCAT to perform.

      0 - Will exit GENCAT and return you to MPE.
      1 - Will display this message.
      2 - Will direct GENCAT to begin the maintenance function.
      3 - Will direct GENCAT to begin the formatting function.
      4 - Will direct GENCAT to begin the expansion function.

For each prompt, an input of an index for HELP or a "?" (depending
upon the type of prompt) will display instruction for that prompt.

Briefly, formatting is the creating of an internal representation of a
source message catalog into a form used by the CATxxxx intrinsics.
Maintenance is modifying the source message catalog by merging a
maintenance file against it.  The merge may be by line numbers
set and message numbers.  Expansion is converting the formatted
file back into a source message catalog.

A carriage return exits GENCAT and returns to MPE.
```

Figure 2-12. GENCAT HELP Facility Dialogue

ERROR MESSAGES

GENCAT error messages are listed in Table 2-1.

Table 2-1. GENCAT Error Messages

#	MESSAGE	MEANING	ACTION
1	FREAD ERROR ON SOURCE FILE.	A failure by FREAD when reading a source message catalog.	Recreate the source message catalog.
2	INPUT FILE MUST HAVE AT LEAST ONE RECORD.	The file has an EOF of zero (0).	Place at least one record in the file.
3	INPUT FILE MUST CONTAIN FIXED LENGTH RECORDS ONLY.	File does not have a fixed record length.	Create the file with a fixed record length.
4	INPUT FILE MUST BE USASCII FILE ONLY.	Source and maintenance files must have records that are in USASCII format.	Create the source and maintenance files with USASCII format.
5	INPUT FILE RECORD SIZE MUST BE BETWEEN 40 AND 256 BYTES.	The record size of a source or maintenance file is greater than 256 bytes (128 words) or less than 40 bytes (20 words).	Create a source and maintenance file with a record size greater or equal to 40 bytes or less than or equal to 256 bytes. (Note that this record length includes any line numbers in the file.)
6	SET NUMBERS MUST BE BETWEEN 1 AND 255.	A set number in a maintenance or source file is not greater than or equal to 1, or not less than or equal to 255. The set number may be negative or it may not be numeric.	Change set number to a value between 1 and 255 inclusive.
8	SET NUMBERS MUST BE IN ASCENDING SEQUENCE.	A set number is less than or equal to the previous set number in the source file. Error can be detected at format time or during a maintenance function.	Change numbers to strict ascending sequence.

Table 2-1. GENCAT Error Messages (Continued)

#	MESSAGE	MEANING	ACTION
9	MESSAGE NUMBERS MUST BE BETWEEN 1 AND 32766.	A message number value is not between 1 and 32766 inclusive.	Change message number value to a value that is between 1 and 32766 inclusive.
10	MESSAGES MUST EITHER CONTAIN ALL NUMBERED OR ALL POSITIONAL PARAMETER SUBSTITUTION CHARACTERS. MIXES NOT ALLOWED.	During the scan of the message, GENCAT detected a mix of parameter substitution characters. For example, a message contained numeric substitution characters as well as positional substitution characters.	Change the parameter substitution characters either to all numeric substitution or all positional substitution characters. (Note that this is for each message only.)
11	MESSAGE NUMBERS MUST BE IN ASCENDING SEQUENCE.	A message number was processed that is less than or equal to the previous message number. The message numbers within a set are not in ascending sequence.	Arrange the messages within the set so that their numbers are in strict ascending order.
12	MESSAGE CONTAINS NON-BLANK CHARACTER IMMEDIATELY FOLLOWING MESSAGE NUMBER. NON-BLANK CHARACTER ASSUMED TO BE A BLANK.	GENCAT detected a non-blank character immediately following the message number in a message. GENCAT replaces this character with a blank.	Insert a blank between the message number and the message text.
13	EXPECTED ONE OF THE FOLLOWING INPUTS: 0, 1, 2, 3, 4, OR A RETURN.	GENCAT detected an incorrect input in response to the first menu (which prompts for a function).	Respond only with 0, 1, 2, 3, 4, or a RETURN.
14	EXPECTED ONE OF THE FOLLOWING INPUTS: 0, 1, 2, 3, OR A RETURN.	GENCAT detected an incorrect input in response to the menu prompting for the type of merging it is to perform.	Respond only with 0, 1, 2, 3, or a RETURN.
15	EXPECTED AN EXISTENT FILE AS INPUT.	The file does not exist on the system.	Either create the file or input the name of a file that does exist on the system.

Table 2-1. GENCAT Error Messages (Continued)

#	MESSAGE	MEANING	ACTION
16	EXPECTED A UNIQUE, NON-EXISTENT FILE NAME AS INPUT.	The file already exists on the system. The name of the file should be one that does not exist on the system.	Purge the file or input the name of a file that does not exist on the system.
17	EXPECTED A RESPONSE OF "YES" OR "NO" AS INPUT.	GENCAT requires a response of either "YES," "yes," "NO," or "no" to the prompt of "SAVE COLLISIONS? Enter "YES" or "NO."	Respond with "YES," "yes," "NO," or "no."
18	INPUT FILES MUST HAVE EQUAL RECORD SIZES FOR THIS FUNCTION.	Source and maintenance files must have equal record sizes if the maintenance file is to modify the source file.	Create a maintenance file that has a record size equal to the record size of the source file.
20	THE CONSTRUCT OF $DELSET IS NOT ALLOWED IN THE SOURCE.	The construct $DELSET, which may be used in a maintenance file, was detected in a source file during a maintenance function.	Remove $DELSET construct from the source file.
21	ONLY FIVE (5) POSITIONAL PARAMETER SUBSTITUTIONS ALLOWED PER MESSAGE.	GENCAT detected more than five (5) parameter substitution characters in one message. Up to five parameter substitution characters are allowed per message.	Only five (5) or fewer parameter substitution characters per message.
22	MAINTENANCE FILE MUST BE NUMBERED FOR LINE-NUMBER MERGES.	The maintenance file is an unnumbered file. The maintenance file must be a numbered file if it is to be used in a line-number merge.	Number the maintenance file if the file is to be used in a line-number merge.
23	SOURCE FILE MUST BE NUMBERED FOR LINE-NUMBER MERGES.	The source file is an unnumbered file. The source file must be a numbered file if it is to be used in a line-number merge.	Number the source file if the file is to be used in a line-number merge.

Table 2-1. GENCAT Error Message (Continued)

#	MESSAGE	MEANING	ACTION
24	SOURCE FILE CANNOT CONTAIN FORMS OF $EDIT.	During a line-number merge, GENCAT examines the source file for $EDIT and $EDIT VOID= constructs. These are not allowed since if collision files are to be used, an ambiguity would exist if the $EDIT and $EDIT VOID= were left in the source file.	Remove all occurrences of $EDIT and $EDIT VOID= from the source file.
25	SEQUENCE NUMBER IN $EDIT VOID RECORD CONTAINS TOO MANY DIGITS. EIGHT IS THE MAXIMUM.	The value following the $EDIT VOID= may have a maximum of eight place holders.	Reevaluate this value and correct it, as it represents a line number.
26	FILE IS NOT A FORMATTED FILE.	GENCAT can only expand formatted catalogs (i.e., files formatted by GENCAT).	Format the file using GENCAT.
27	SET RECORD IS REQUIRED BEFORE A MESSAGE RECORD IS FORMATTED.	A message was found before set number was defined.	Place the message in a set or place a set number before the message.
28	VALUE IN RIGHT BYTE OF KANJI CHARACTER IS INVALID.	Your message contains special escape sequences provided by HP that are used for research and development activities. These special escape sequences are not supported by HP and HP assumes no responsibility for their use.	For messages 28 through 32, consult your HP representative, or remove all occurrences of the form "esc$<terminator>" or "ESC(<terminator>" from your message catalog. Where ESC is the escape character, <terminator> is "@" or "A" through "Z".
29	SCAN COMPLETED WITH NO CLOSING KANJI ESCAPE SEQUENCE. EXPECTS A CLOSING KANJI ESCAPE SEQUENCE TO TERMINATE KANJI CHARACTER SEQUENCE.	See Message Number 28.	See Message Number 28.

Table 2-1. GENCAT Error Messages (Continued)

#	MESSAGE	MEANING	ACTION
30	INCOMPLETE KANJI CLOSING ESCAPE SEQUENCE DETECTED.	See Message Number 28.	See Message Number 28.
31	VALUE IN LEFT-BYTE OF KANJI CHARACTER IS INVALID.	See Message Number 28.	See Message Number 28.
32	VALUE IN PARAMETER SECTION OF KANJI ESCAPE SEQUENCE IS INVALID. EXPECTED A STRING OF DIGITS.	See Message Number 28.	See Message Number 28.
33	BLANK RECORDS THAT ARE NOT CONTINUATION RECORDS ARE NOT ALLOWED.	GENCAT detected a blank record in the source catalog and this record is a continuation record for the previous record.	Remove the record from the source file, or modify the record immediately before it to end with a "%" or a "&" character.

Table 2-2. MAKECAT/GENCAT Comparison

FEATURES	MAKECAT	GENCAT
Access Methods	The FOPEN, GENMESSAGE, and FCLOSE intrinsics are used to open, access, and close formatted MAKECAT catalogs.	CATOPEN, CATREAD, and CATCLOSE intrinsics open, access and close formatted GENCAT catalogs.
Formatting	Places an internal directory in the file's user labels. The file is formatted in place without creating a new file.	A source message file is formatted into another file, leaving the original source intact. The application uses the formatted file. The original source file can be purged. The formatted file can be expanded to restore the original source file.
Function	Converts or formats HELP and message files into catalogs. Installs system message catalog, using the BUILD entry point.	Formats application message catalogs. Provides maintenance facility to modify existing source catalogs. Provides capability of expanding a formatted file back into the original source file.
Input	The name of a file must be entered in a file equation. :FILE INPUT=<*your file*>.	GENCAT prompts the user for the name of a file.
Literal Character	Not supported.	The tilde "~" serves as a literal character, causing the character which immediately follows it to be treated as text.
Messages	The message number range per set is 1-255.	The message number range per set is 1-32766.
Numerical Parameters	Not supported.	Up to 5 numerical parameters can be contained in a message.
Output	Saves the formatted file as a temporary file with the name CATALOG.	GENCAT prompts the user for the name of the formatted file. The file is saved as a permanent file.
Processing	Formats more quickly than GENCAT.	GENCAT verifies each message for correct parameter substitution characters. Manipulates two temporary files while formatting the source file.

Table 2-2. MAKECAT/GENCAT Comparison (Continued)

FEATURES	MAKECAT	GENCAT
Record Format	Accepts source files of any size, but the file it saves has a record size of 80 bytes. The system message catalog is fixed binary. An application catalog is fixed ASCII.	Accepts source catalog files with record sizes from 40 to 256 bytes. The formatted file has a record size of 128 words, and is fixed binary. When a formatted catalog is expanded into a source catalog, the new source catalog is fixed ASCII with a record size identical to the original source catalog. When maintenance is being performed, both the source file and the maintenance file must be of equal lengths in fixed ASCII. The resulting source file, and collision file, if specified will be fixed ASCII, and their record sizes will equal the record size of the original source file.
Sets	The set directive is $SET. The set number range for a catalog is 1-63.	The set directive can be $SET or $set. The set number range for a source catalog is 1-255.
User Interface	The user must know which entry points to use and when to use them. Files are input via file equations. Error messages require user interpretation.	GENCAT is menu-driven. The menus originate from a catalog. Each prompt has HELP text associated with it. Error messages are self-explanatory.

NLS IN MPE SUBSYSTEMS

SECTION III

Native Language Support (NLS) supplies the applications designer with the tools to support native language data and local custom formats. NLS provides support features in FCOPY, IMAGE, KSAM, QUERY, SORT-MERGE and VPLUS. COBOLII access to native language collating sequences is included in the SORT-MERGE subsection discussion.

The emphasis of NLS in the subsystems is on providing the end-user, rather than the application designer, with local language data and formats. User interfaces (prompts, commands and messages) of the subsystem utility programs, e.g., FORMSPEC or DBUTIL, are not localized.

These notes on the subsystems are intended to be used as addenda to the subsystems manuals. Refer to the SORT-MERGE, KSAM, FCOPY, QUERY, IMAGE and VPLUS manuals for complete documentation on these subsystems. The format of each subsystems manual has been maintained as much as possible in these updates.

FCOPY

Native Language Support (NLS) features in FCOPY can be accessed by adding a LANG= parameter to the existing options.

```
:FCOPY FROM=A; TO=B; LANG=GERMAN; UPSHIFT
```

If the LANG= parameter is omitted, FCOPY fetches the current data language with NLGETLANG (mode 2). If there is none, or if it is NATIVE-3000, FCOPY functions as it did before the introduction of NLS.

FCOPY Options

The FCOPY options affected by language dependency are character printing, translating, upshifting, and updating KSAM files.

CHAR OPTION. Character codes not represented by symbols are displayed as periods. The TO= file can be a line printer, a keyboard display terminal, or an intermediate disc file to be listed at a later time.

CHAR	No LANG=	The NATIVE-3000 processing scheme will be retained.
CHAR	LANG=	The character definition table associated with the language will be used. Characters of type 3 (undefined graphic character) and 5 (control code) as in NLINFO item 12, are replaced by periods. Refer to Section IV, "NATIVE LANGUAGE INTRINSICS," for more information.

CHARACTER TRANSLATE OPTIONS. These options translate data for ASCII-to-EBCDIC and EBCDIC-to-ASCII conversions.

EBCDICIN/
EBCDICOUT

Input of the LANG= parameter will result in the translation table associated with the language being used.

For example, using an EBCDIC-to-ASCII conversion table, FCOPY converts data from German EBCDIC to ROMAN8:

```
>FROM=MYGEBCFL; TO= MYROM8FL; LANG=GERMAN; EBCDICIN
EOF FOUND IN FROMFILE AFTER RECORD 29

30 RECORDS PROCESSED *** 0 ERRORS
```

UPSHIFT OPTION. The UPSHIFT option converts lowercase alphabetic characters of supported native languages to their corresponding uppercase characters as part of the copying operation.

UPSHIFT	No LANG=	Any character belonging to USASCII or to one of the extensions will be upshifted as it would have been before the introduction of NLS.
	LANG=	All characters will be upshifted according to the given language's upshift definition.

FCOPY AND KSAM FILES. To change the language of an existing file, a new KSAM file must be built with the new language attribute, and the old file copied into the new. If FCOPY copies an existing KSAM file to a new KSAM file the same language attribute is assigned to the new file. The LANG= option of FCOPY cannot be used to change the language of a KSAM file.

Combined Use Of Options

Using LANG= without another relevant option such as UPSHIFT or EBCDICIN usually results in a warning message:

```
<<966>>  WARNING: LANG OPTION NOT RELEVANT
```

The user can continue without affecting the outcome of the operation. The LANG= option is ignored.

The following combinations are flagged as an error:

```
BCDICIN;LANG=xxx
BCDICOUT;LANG=xxx
EBCDIKIN;LANG=xxx
EBCDIKOUT;LANG=xxx
KANA;LANG=xxx
```

For example:

```
>FROM=DEUTSCH; TO=DANSK; LANG=GERMAN; BCDICIN
*57*SYNTAX ERROR: ILLEGAL COMBINATION OF OPTIONS

0 RECORDS PROCESSED *** 1 ERROR
```

Error Messages

Table 3-1 lists the error messages for FCOPY.

Table 3-1. FCOPY Error Messages

ERROR #	MESSAGE	CAUSE	ACTION
960	LANGUAGE NOT CONFIGURED.	The language requested is not configured on the system.	Verify spelling of language name. Ask the System Manager to configure the language on the system.
961	NLS NOT CONFIGURED.	No native languages are configured on the system.	Ask the System Manager to configure the native language on the system.
966	WARNING: LANG OPTION NOT RELEVANT.	The LANG option is not relevant to command last entered.	Check command for correct options. You are given the choice whether or not to continue the operation.

Performance Issues

The implementation of CHAR, UPSHIFT, and EBCDICIN/EBCDICOUT using NLS intrinsics and language definition tables requires additional time for the conversion process.

IMAGE

Native Language Support (NLS) in IMAGE enables the user to assign a language attribute to a data base. This language attribute determines the collating sequence used to insert an entry with a sort item of type X or U in a sorted chain. It also determines the operation of comparisons for entry level DBLOCK calls. In order to use NLS with IMAGE, this language attribute will have to be specified by the user either at schema processing time or through the SET command in DBUTIL.

Utility Programs

NLS features in IMAGE can be requested in four utilities: DBSCHEMA, DBUTIL, DBUNLOAD, and DBLOAD.

DBSCHEMA. The optional language attribute will be specified:

BEGIN DATA BASE *databasename*[,LANGUAGE: *language*];

The language name or ID number can be used for *language*. If no LANGUAGE is specified, the data base will use NATIVE-3000 as a default.

The names of data items and data sets are restricted to certain USASCII characters. This allows schemas to be valid internationally, for all Hewlett-Packard 8-bit character sets. It also allows the sources of application programs which call IMAGE intrinsics to be entered from and displayed on all 8-bit and 7-bit (USASCII) terminals.

DBUTIL. DBUTIL includes the SET, HELP, and SHOW commands:

SET: SET LANGUAGE= *language*. This command can be issued only on a virgin ROOT file or an empty data base (where <*language*> is the language name or language ID number).

HELP: HELP SHOW and HELP SET will display the syntax for SHOW and SET commands with the LANGUAGE option.

SHOW: SHOW *databasename* [*/maintword*] LANGUAGE. The language attribute of the data base is displayed.

DBUNLOAD/DBLOAD. DBUNLOAD copies the data to specially formatted tapes or disc volumes. The language ID number of the data base is stored along with the data.

DBLOAD warns the user who tries to load data when the language attribute of the data base on disc and the data base on tape are incompatible:

```
WARNING: THE LANGUAGE OF THE DATA BASE IS DIFFERENT FROM THE LANGUAGE
FOUND ON THE DBLOAD MEDIA.
```

If the user is running DBLOAD in a session, the user may choose to continue:

```
CONTINUE DBLOAD OPERATION ? (Y/N)
```

In case of a job execution of DBLOAD, or a negative answer ("N") to the previous question, the DBLOAD operation is prematurely terminated.

Intrinsics

The language attribute of the IMAGE data base enables the IMAGE intrinsics to utilize native language features.

DBOPEN. DBOPEN checks the language attribute of the data base. When the language attribute of the data base is not supported by the current configuration of the system, an error code of -200 is returned:

```
DATA BASE LANGUAGE NOT SYSTEM SUPPORTED.
```

DBPUT. The position of a new entry with a type X or U item in a sorted chain is determined according to the collating sequence of the language attribute of the data base.

If the data base language attribute is NATIVE-3000, the insertion of a new entry in the sorted chain is determined by the result of a BYTE COMPARE between the key of the new record and the keys of the entries already in the chain.

If the data base has a language attribute other than NATIVE-3000, the collating sequence definition of the native language is used via a system version of the NLCOLLATE intrinsic to determine where to insert the new entry.

DBINFO. DBINFO provides additional information about the language attribute of the data base:

Mode:	901
Purpose:	Obtain language attribute of the data base.
Qualifier:	Ignored
Buffer Array Contents:	Word 1 contains the language ID number.

DBLOCK. If a lock item is of type U or X, and a lock specifies an inequality (range), the collating sequence for the language of the data base will be used.

Changing The Language Attribute Of An IMAGE Data Base

This change cannot be done with a single command. Once data has been stored in an IMAGE data base with a native language attribute, changing the language attribute requires reorganizing data along any sorted chains according to the collating sequence of the new language.

The procedure is:

1. DBUNLOAD the data base.
2. Purge the data base using PURGE in DBUTIL.
3. Modify the schema with the language attribute set by the LANGUAGE: parameter and create a new root file with the schema processor.
4. Create the data base using CREATE in DBUTIL.
5. Run DBLOAD in session mode. A warning message is issued because the language has been changed. A prompt is displayed:

   ```
   CONTINUE DBLOAD OPERATION? (Y/N)
   ```

   Enter "Y" to complete the change of the language attribute.

NOTE

All IMAGE data bases created before NLS are considered to have NATIVE-3000 as a language attribute.

Error Messages

The three types of error messages used in IMAGE are listed in the following tables. Table 3-2 lists Utility Program Conditional Messages, Table 3-3 lists Library Procedure Calling Errors, and Table 3-4 lists Schema Syntax Errors.

Table 3-2. IMAGE Utility Program Conditional Messages

MESSAGE	MEANING	ACTION
DATA BASE LANGUAGE NOT SYSTEM SUPPORTED.	Language of the data base is not currently configured on your system.	Ask the System Manager to configure the native language on your system, or provide a valid language.
ERROR READING ROOT FILE RECORD.	DBUTIL is unable to read a root file record.	Contact your Hewlett-Packard support representative.
ERROR WRITING ROOT FILE RECORD.	DBUTIL has detected an error while writing a root file record.	Contact your Hewlett-Packard support representative.
INVALID LANGUAGE.	Language name or number contains invalid characters.	Retype the correct language name.
LANGUAGE MUST NOT BE LONGER THAN 16 CHARACTERS.	Language name is too long and, therefore, must be incorrect.	Retype the correct language name.
LANGUAGE NOT SUPPORTED.	The language specified is either not supported on your system or is not a valid language name or number.	Contact the System Manager for configuration of that language, or provide a valid language.
NLINFO FAILURE.	An error was returned by MPE NLS.	Contact your Hewlett-Packard support representative.
NLS RELATED ERROR.	An error was returned by MPE NLS on a DBOPEN on the data base.	Contact your Hewlett-Packard support representative.
WARNING: THE LANGUAGE OF THE DATA BASE IS DIFFERENT FROM THE LANGUAGE FOUND ON THE DBLOAD MEDIA.	User has changed the language attribute of the data base between DBUNLOAD and DBLOAD. DBLOAD wants the user to be aware of potential differences in sorted chains of the collating sequence of the two languages (the language of the data base on disc and on tape) are different. In session mode the question "CONTINUE DBLOAD OPERATION?" is asked. In job mode, DBLOAD will terminate execution.	After noting the information returned by DBLOAD, and the result on eventual sorted chains in the data base, proceed with the operation by answering "YES."

Table 3-3. IMAGE Library Procedure Calling Errors

CCL	CONDITION	MEANING	ACTION
-200	DATA BASE LANGUAGE NOT SYSTEM SUPPORTED.	DBOPEN attempted to open the data base and found that the language of the data base is not currently configured. The collating sequence of the language is unavailable; DBOPEN cannot open the data base.	Ask the System Manager to configure the language on your system.
-201	NATIVE LANGUAGE SUPPORT NOT INSTALLED.	NLS internal structures have not been built at system startup. The collating sequence table of the language of the data base is unavailable; DBOPEN cannot open the data base.	Ask the System Manager to install NLS.
-202	MPE NATIVE LANGUAGE SUPPORT ERROR #1 RETURNED BY NLINFO.	The error number given was returned by MPE NLS on a NLINFO call in DBOPEN.	Ask the System Manager to install NLS.

Table 3-4. IMAGE Schema Syntax Errors

MESSAGE	MEANING	ACTION
BAD LANGUAGE.	Language name contains invalid characters or language number is not a valid integer.	Examine schema to find incorrect statement, edit, and run Schema Processor again.
DATA BASE NAME TOO LONG.	Data base name contains more than six characters.	Examine schema to find incorrect statement, edit, and run Schema Processor again.
LANGUAGE EXPECTED.	Schema Processor expected at this point to find a LANGUAGE statement after the comma following BEGIN DATA BASE name statement.	Examine schema to find incorrect statement, edit, and run Schema Processor again.
LANGUAGE NOT SUPPORTED.	Language specified is not currently supported on your system or is not a valid language.	Examine schema to find incorrect statement, edit, and run Schema Processor again.
NATIVE LANGUAGE SUPPORT ERROR.	An error was returned by MPE NLS.	Contact your Hewlett-Packard support representative.

KSAM

The Keyed Sequential Access Method (KSAM) organizes records in a file according to the content of key fields within each record.

Native Language Support (NLS) in KSAM provides the resources to create files whose keys of type BYTE are sorted according to a native language collating sequence. All BYTE keys in the file will be sorted using the collating sequence table of the specified language. Keys, as well as data in the record, may contain 8-bit character data.

A file language attribute may be supplied when a KSAM file is created to provide a key file organized according to the collating sequence of a native language. The language attribute is provided when the file is created. All KSAM files created before NLS was introduced are considered to have NATIVE-3000 as a language attribute.

A KSAM file can be built with KSAMUTIL, or programmatically using FOPEN.

Creating KSAM Files With KSAMUTIL

When using KSAMUTIL, the parameter LANG=*langname* or LANG=*langnum* may be supplied on the BUILD command, as shown in Figure 3-1. NATIVE-3000 is used as the default language attribute if no language is specified.

The language specified in the LANG= parameter must be installed on the system at the time the command is issued for KSAMUTIL to build the file. If the language is not installed, an error message is returned and the file is not built.

Danish is specified as the language in the example. The language attribute of the KSAM file can be checked by the VERIFY command (mode 3).

```
:RUN KSAMUTIL.PUB.SYS

HP32208A.03.13  THU, FEB 16, 1984,  8:54 AM    KSAMUTIL VERSION:A.03.13
>BUILD TEST;REC=-80,3,F,ASCII;KEY=B,1,4;KEYFILE=TESTK;LANG=DANISH
>VERIFY

WHICH (1=FILE INFO, 2=KSAM PARAMETERS,  3=KSAM CONTROL, 4=ALL)?4


TEST.LORO.NLS              CREATOR=SLORO
FOPTIONS(004005)=KSAM, :FILE, NOCCTL, F, FILENAME, ASCII, PERM
AOPTIONS(000400)=DEFAULT, NOBUF, DEFAULT, NO FLOCK, NO MR, IN
RECSIZE:SUB:TYP:LDNUM:DRT:UN.:  CODE:LOGICAL PTR: END OF FILE:FILE LIMIT
    -80:  9:  0:    3: 89:  2:     0:          0:          0:      1023
 LOG. COUNT:PHYS. COUNT:BLK SZ:EXT SZ:NR EXT: LABELS:LDN:   DISCADDR:
          0:          0:  -240:    43:     8:       0:  3:00000234251:

KEY FILE=TESTK    KEY FILE DEVICE=4         SIZE=       114  KEYS=      1
FLAGWORD(000020)=RANDOM PRIMARY, FIRST RECORD=0, PERMANENT
KEY TY LENGTH   LOC. D KEY BF  LEVEL
  1  B      4      1 N    168      1

DATA FILE = TEST    VERSION= A.3.13
KEY CREATED= 47/'84  9: 0: 7.6      KEY ACCESS=  47/'84  9: 0:19.2
KEY CHANGED= 47/'84  9: 0: 8.5      COUNT START= 47/'84  9: 0: 8.6
DATA RECS  =       0 DATA BLOCKS=       0 END BLK WDS=           0
DATA BLK SZ=     120 DATA REC SZ=      80 ACCESSORS=            0
FOPEN              1 FREAD              0 FCLOSE                 1
FREADDIR           0 FREADC             0 FREADBYKEY             0
FREMOVE            0 FSPACE             0 FFINDBYKEY             0
FGETINFO           1 FGETKEYINFO        0 FREADLABEL             0
FWRITELABEL        0 FCHECK             0 FFINDN                 0
FWRITE             0 FUPDATE            0 FPOINT                 0
FLOCK              0 FUNLOCK            0 FCONTROL               0
FSETMODE           0 FREE KEYBLK        0 FREE RECS              0
KEYBLK READ        2 KEYBLK WRITTEN     0 KEYBLK SPLIT           0
KEY FILE EOF      10 FREE KEY HD        0 SYSTEM FAILURE         0
MIN PRIME          0 MAX PRIME          0 RESET DATE
DATA FIXED      TRUE DATA B/F           3 TOTAL KEYS             1
FIRST RECNUM       0 MIN RECSIZE        4 LANG                DANISH

WHICH (1=FILE INFO, 2=KSAM PARAMETERS,  3=KSAM CONTROL, 4=ALL)?

>E

END OF PROGRAM
:
```

Figure 3-1. KSAM File Test Program

Error Messages

KSAMUTIL error messages are listed in Table 3-5.

Table 3-5. KSAMUTIL Error Messages

ERROR #	MESSAGE	CAUSE	ACTION
1070	'LANG' NOT FOLLOWED BY '=' OR HAS TOO MANY PARAMETERS.	Improper syntax was used in specifying the language name.	Enter language name using correct syntax.
1071	'LANG' LANGUAGE VALUE TOO LONG OR ABSENT.	Language name too long, or missing as a parameter.	Enter correct language name.
1072	'LANG' LANGUAGE NUMBER VALUE INVALID.	The language number contains invalid characters.	Enter correct language number.
1073	'LANG' LANGUAGE NOT SUPPORTED.	Language specified is not configured on your system, or not a valid language name or number.	Ask the System Manager to configure the language on your system.
1074	NATIVE LANGUAGE SUPPORT IS NOT INSTALLED.	NLS is not installed on your system.	Ask the System Manager to configure the language on your system.
1075	NATIVE LANGUAGE SUPPORT LANGUAGE NOT SUPPORTED.	An NLS MPE error occurred. No language table exists for language specified.	Ask the System Manager to configure the language on your system.
1076	NATIVE LANGUAGE SUPPORT RELATED ERROR.	An NLS MPE error occurred.	Ask the System Manager to configure the language on your system; if it is already configured, contact your Hewlett-Packard support representative.

Additional Discussion

Refer to Appendix A of the KSAM Manual (30000-90079) for more information on error messages.

Creating KSAM Files Programmatically

The user must provide the *langnum* when calling FOPEN to build a KSAM file. The *langnum* is stored in word 10 of the KSAMPARAM array. The FOPEN intrinsic checks each time a KSAM file is opened to determine whether the language used is configured on the system. For backward compatibility reasons bit 11 in the flagword (word 15) must be set to 1 if a language other than 0 (NATIVE-3000) is used, to denote that word 10 contains valid information.

If bit 11 of flagword is 0, the default language, NATIVE-3000, is used and the data in word 10 is ignored. If the language is not configured, condition code CCL is returned by FOPEN.

The file system error messages listed in Table 3-6 have been included with NLS:

Table 3-6. KSAM File System Error Messages

ERROR #	MESSAGE	CAUSE	ACTION
196	LANGUAGE NOT SUPPORTED.	The language name or number specified for FOPEN is not configured on your system, or is not a valid language name or number.	Ask the System Manager to configure the language on your system.
197	NATIVE LANGUAGE SUPPORT RELATED ERROR.	An NLS MPE error occurred on a FOPEN call.	Contact your Hewlett-Packard support representative.

Additional Discussion

Refer to Appendix A in the KSAM Manual (30000-90079) for a complete list of KSAM file system errors.

Modifying KSAM Files

Every record added or updated in a KSAM file has its new keys of type BYTE inserted in the key file according to the collating sequence of the language defined for that KSAM file. That function is handled internally by a system version of the NLCOLLATE intrinsic when the language attribute of the file is different from NATIVE-3000. A new key in a file with a NATIVE-3000 language attribute will be ordered according to the result of a BYTE COMPARE between the key of the new record and the keys of the records already in the key file.

Generic Keys

NLS collating sequences differ from the USASCII collating, and the differences must be considered when performing generic key searches. Refer to Appendix C, "COLLATING IN EUROPEAN LANGUAGES," for more information.

The description of a generic key search in a KSAM file with a native language attribute is presented from an application point of view.

Keys matching a certain generic key may not be in consecutive order in the key file because the keys are sorted according to a native language collating sequence. The key sequence in Figure 3-3 illustrates this with a French KSAM file; *keylength* is 4, the generic key length is 2. The partial key "aa" appears in non-consecutive keys (with a result of 0 in the last column of the figure). Records containing partial keys (such as "AA" or "Aa") are intermixed according to the French collating sequence. These keys have a result of 1 listed.

If a generic key search is performed in a KSAM file with a language attribute other than NATIVE-3000, the application program must determine whether the retrieved record matches the generic key and, even if it does not, whether subsequent records might still match it.

The codes returned by NLKEYCOMPARE are shown in Figure 3-2.

Refer to Section IV, "NATIVE LANGUAGE INTRINSICS," for a complete discussion of the NLKEYCOMPARE intrinsic.

RESULT	MEANING
0	The retrieved key matches the generic key exactly.
1	The retrieved key does not match the generic key. Uppercase/lowercase priority or accent priority is different.
2	The retrieved key value is less than the generic key. It precedes the designated key in the collating sequence.
3	The retrieved key is greater than the generic key.

Figure 3-2. Results Returned By The NLKEYCOMPARE Intrinsic

The generic key search sequence is:

1. After FFINDBYKEY has been called with >= as relational operator (relop), the logical record pointer points to the data record indicated by the arrow labeled "Case 2".

2. The subsequent FREAD call will retrieve the data record. When the partial key "AA" is compared to the generic key "aa" they are found to be different.

   This comparison is done by calling the intrinsic NLKEYCOMPARE using the generic key and the key found in the record. The result returned by NLKEYCOMPARE tells the application whether the FREAD delivered a record:

   a. Before the desired range (result 2).

   b. In the desired range with an uppercase/lowercase or accent priority difference (result 1).

   c. With an exact match (result 0).

   d. After the desired range (result 3).

3. To get all records whose key match the generic key exactly, the FREAD calls and subsequent NLKEYCOMPARE calls should continue until a result of 3 is returned.

When performing a generic key search in a KSAM file with a native language attribute other than NATIVE-3000 use the NLKEYCOMPARE intrinsic to compare partial keys and generic keys.

Refer to programs I and J in Appendix H, "EXAMPLE PROGRAMS," for generic key searches in KSAM files with native language attributes.

Key length: 4

Language: FRENCH (only USASCII characters are used in the example).

Desired records are all records whose record key starts with "aa"
(generic key = "aa", length = 2).

Pointer Position	Key Value	NLKEYCOMPARE Result ("aa" Compared to Key)
Case 1 --->	A	2
	a	2
Case 2 --->	AA	1
	Aa	1
	aA	1
	aa	0
	AAA	1
	aaa	0
	AAAA	1
	AAAa	1
	AAaa	1
	AaAa	1
	AaaA	1
	Aaaa	1
	aAAA	1
	aAAa	1
	aAaA	1
	aaAA	0
	aaaA	0
	aaaa	0
Case 3 --->	Baaa	3
	baaa	3

Case:
1. FREAD starting at the beginning of the file.
2. FFINDBYKEY with relational operator = or >= and subsequent FREAD calls.
3. FFINDBYKEY with relational operator > and subsequent FREAD calls.

Key Value: Key values in ascending sequence.

Figure 3-3. Generic Key Searches

Using FCOPY With KSAM Files

COPYING FROM A KSAM FILE TO ANOTHER KSAM FILE. If the KSAM file already exists (built via KSAMUTIL or programmatically) the keys of type BYTE are put into the new file according to the collating sequence belonging to the language of the "TO" file. If the file does not exist, a new file is built with the same language attribute as the "FROM" file.

CHANGING THE LANGUAGE ATTRIBUTE OF A KSAM FILE. FCOPY cannot be used to change the language attribute of an existing file. KSAMUTIL must be used to build a new KSAM file with the new language attribute. Then the data can be copied to this file using FCOPY. Keys of type BYTE in the destination key file will be ordered according to the collating sequence of the new language.

Moving NLS KSAM Files To Pre-NLS MPE

Restoring a KSAM file with a native language attribute other than NATIVE-3000 to a system without NLS installed can result in an incorrect key sequence in the key file for type BYTE keys. Systems without NLS installed do not recognize any collating sequence except NATIVE-3000.

If a file with a native language attribute other than NATIVE-3000 is restored, the first FOPEN on the file will return the same error condition code as if a system failure occurred while the file was opened. KSAMUTIL should be used to build a new KSAM file. The file with the native language attribute is recovered, and FCOPY is used to copy the recovered file into the new KSAM file. See Figure 3-4 for an example of this recovery procedure.

```
:RUN KSAMUTIL.PUB.SYS

HP32208A.03.10 SAT,  SAT, MAY 26,1984, 12:33 PM  KSAMUTIL VERSION:A.03.10
>BUILD NEWDATA;REC=-80,3,F,ASCII;KEY=B,1,4:KEYFILE=NEWKEY
>KEYINFO OLDDATA;RECOVER


>EXIT

:FCOPY FROM=OLDDATA;TO=NEWDATA;KEY=0

:RUN KSAMUTIL.PUB.SYS


HP32208A.03.10 SAT,  SAT, MAY 26,1984, 12:33 PM  KSAMUTIL VERSION:A.03.10
>PURGE OLDDATA
>RENAME NEWDATA,OLDDATA
>RENAME NEWKEY,OLDKEY
>EXIT
```

Figure 3-4. KSAM Recovery Procedure

QUERY

QUERY operations are performed by entering commands consisting of key words and parameters.

Native Language Support (NLS) features can be accessed in QUERY to retrieve data which meet user-defined selection criteria, and to sort data according to native language collating sequences. The user must know what the native language in QUERY is, how the language is specified, how the language affects the output, and how to determine which language is being used.

IMAGE data bases have a language attribute that describes the collating sequence used in sorted chains and locking. This language attribute does not affect QUERY operation.

Although QUERY commands are in English, the user can expect the output data to be sorted and formatted according to the QUERY user's language. The language of the data base may determine the data sequence while using QUERY passively for data retrieval (FIND). When data is being sorted or formatted by QUERY, the user's language will determine the ordering and formatting of the data.

For example, in a French data base with a QUERY user's language of Danish, data items in a sorted chain might be retrieved according to the French collating sequence; but the sorting or formatting is done according to Danish criteria.

The user can specify the QUERY user's language by:

- Using a QUERY command:

  >LANGUAGE = *langnum* or >LANGUAGE=*langname*. Default is NLUSERLANG.

- Using an MPE command:

  :SETJCW NLUSERLANG = *langnum*. Default is NATIVE-3000.

For example, if the user's language is French, the QUERY command is:

```
>LANGUAGE = 7
```

or

```
>LANGUAGE = FRENCH
```

Or the MPE Job Control Word NLUSERLANG may be used: :SETJCW NLUSERLANG=7.

The >LANGUAGE= command always overrides NLUSERLANG. If neither option is used to specify the user's language, QUERY assumes LANGUAGE=0 (NATIVE-3000). NATIVE-3000 is the default, which ensures backward compatibility. When the user's language is NATIVE-3000, QUERY performs as it did before NLS features were available.

QUERY allows access to more than one data base at the same time. This means that more than one data base language attribute may be active at the same time. In any case, upshifting, collating, range selection, formatting, or sorting is dependent on the QUERY user's language specified by the user via the JCW NLUSERLANG or the LANGUAGE= command.

Command Summary

NLS can affect QUERY in upshifting data, range selection, date format, real number conversions, and sorted lists and numeric data editing in REPORT.

UPSHIFTING DATA (TYPE U ITEMS). QUERY upshifts commands and the data of type U items. QUERY commands are upshifted according to NATIVE-3000. Data is upshifted according to the user's language to UPDATE ADD (or ADD), UPDATE REPLACE (or REPLACE), FIND, LIST, MULTIFIND, and SUBSET.

RANGE SELECTION. QUERY collates data according to the user's language in FIND, LIST, MULTIFIND, or SUBSET. The MATCH feature (in FIND and MULTIFIND commands) is no longer valid when LANGUAGE <> 0 (NATIVE-3000). QUERY will display an error message if MATCH is used in an interactive mode, and will abort the session in a batch mode.

DATE FORMAT. DATE is a reserved word in the REPORT command which provides the system date. It is formatted according to the user's language.

REAL NUMBER CONVERSIONS. In the commands REPORT and LIST the output is formatted according to the user's language. For example, 123.45 in NATIVE-3000 becomes 123,45 in FRENCH.

SORTED LISTS IN REPORT. QUERY sorts type U or X items in a REPORT according to the collating sequence of the user's language.

NUMERIC DATA EDITING IN REPORT. QUERY converts the data edited using the NATIVE-3000 edit mask (using the period as a decimal point and a comma as thousands separator) to the corresponding characters in the user's language.

Additional Discussion

Refer to the QUERY Reference Manual (30000-90042) for a complete description of these commands.

The commands listed in Table 3-7 are used to obtain language-dependent information.

Table 3-7. Commands For Language-Dependent Information

COMMAND	LANGUAGE-DEPENDENT INFORMATION
>HELP LANGUAGE	Explains LANGUAGE command function, format and parameters.
>SHOW LANGUAGE	Displays the QUERY user's language.
>FORM	Displays the data base language attribute.

Error Messages

QUERY error messages which support the NLS enhancement are listed in Table 3-8.

Table 3-8. QUERY Error Messages

MESSAGE	MEANING	ACTION
DBINFO MODE 901 FAILED. CHECK DATA BASE LANGUAGE ATTRIBUTE AND IMAGE VERSION.	The version of IMAGE on your system does not have NLS features.	This is a warning. The user may wish to update IMAGE/3000 to the same level as QUERY.
EXPECTED A LANGUAGE NUMBER OR NAME.	The LANGUAGE command only accepts the name of a language or the number associated with that name.	Enter HELP LANGUAGE for a complete explanation of the command and then re-enter it.
INTERNAL QUERY NLS PROBLEM.	The NLS subsystem encountered an error from which it could not recover while attempting to initialize language-dependent information.	Contact your Hewlett-Packard support representative.

Table 3-8. QUERY Error Messages (Continued)

MESSAGE	MEANING	ACTION
LANGUAGE INVALID. NATIVE-3000 USED.	Language specified not configured. The default, NATIVE-3000 was used.	Run NLUTIL.PUB.SYS to list the languages and associated numbers available on your system.
LANGUAGE NOT CONFIGURED ON THIS SYSTEM. NATIVE-3000 USED.	Languages are configured on each system. Language specified is not available on your system. The default language is NATIVE-3000.	Run NLUTIL.PUB.SYS to list the languages and associated numbers available on your system.
MATCH NOT VALID WHEN LANGUAGE <> NATIVE-3000.	QUERY can only allow the matching option for NATIVE-3000.	If possible, change the language to NATIVE-3000 for the match.
NLCOLLATE INTRINSIC INTERNAL ERROR.	An unexpected error condition occurred while doing a comparison of the data.	Contact your Hewlett-Packard support representative.
NLUTIL INTRINSIC INTERNAL ERROR.	The NLS subsystem encountered an error from which it could not recover while attempting to initialize language-dependent information.	Contact your Hewlett-Packard support representative.
USER LANGUAGE INVALID.	User language not available. Only NATIVE-3000 is available on your system.	Ask the System Manager to configure the desired language on your system.
USER LANGUAGE NOT CONFIGURED ON THIS SYSTEM. NATIVE-3000 USED.	Languages are configured on each computer system. Language specified is not available on your system. The default language is NATIVE-3000.	Run NLUTIL.PUB.SYS to list the languages and associated numbers available on your system.

SORT-MERGE

SORT-MERGE organizes records in a file according to the collating sequence of the keys. The default collating sequence for character data is based on the binary values of the characters. EBCDIC and user-defined sequences can also be used. Native Language Support (NLS) in SORT-MERGE provides the user with the option of collating according to a native language sequence.

SORT-MERGE can be used as a stand-alone program or programmatically.

Stand-Alone SORT-MERGE

The key type CHARACTER allows the user to access native language collating sequences. The specific native language collating sequence is assigned by the LANGUAGE command.

C[HARACTER] The collating sequence defined in the LANGUAGE command is used to sort keys of type CHARACTER. Refer to Figure 3-5 for an example of the use of the CHARACTER key type.

COMMAND	SYNTAX	DESCRIPTION
LANGUAGE	>L[ANGUAGE] [IS] {*langnum* } {*langname*}	Defines the native language collating sequence to be used to sort keys of type CHARACTER.

The LANGUAGE command may specify a language ID number (*langnum*) or language name (*langname*). The language specified must be configured on the system. If the LANGUAGE command is not used, the language to be used for collating keys of type CHARACTER defaults to NLDATALANG, the language returned by the NLGETLANG intrinsic (mode 2).

In Figure 3-5 the LANGUAGE command designates Swedish. The VERIFY command will confirm which language collating sequence will be used for the SORT or MERGE stand-alone program.

```
:RUN SORT.PUB.SYS
HP32214C.04.00 SORT/3000 MON, JAN 30, 1984, 1:52 PM
(C) HEWLETT-PACKARD CO. 1983

>INPUT MYFILE
>OUTPUT $STDLIST
>KEY 1,4, CHARACTER
>LANGUAGE IS SWEDISH
>VERIFY

INPUT FILE = MYFILE
RECORD LENGTH = SAME AS THAT OF THE INPUT FILE
OUTPUT FILE = $STDLIST
KEY POSITION      LENGTH      TYPE      ASC/DESC
        1           4       CHAR          ASC       (MAJOR KEY)
LANGUAGE IS SWEDISH
>END
```

Figure 3-5. Stand-Alone SORT-MERGE Dialogue

Programmatic SORT-MERGE

To use SORT-MERGE programmatically with NLS features, the user must designate the collating sequence with the *charseq* parameter in the SORTINIT and MERGEINIT intrinsics.

THE SORTINIT INTRINSIC. The syntax for a procedure call using SORTINIT is:

```
                IA          IA            IV        IV      DV      IV
SORTINIT (inputfiles,outputfiles,outputoption,reclen,numrecs,numkeys,
           IA     IA       LP        P          IA        L       I
         keys,altseq,keycompare,errorproc,statistics,failure,errorparm,
                 I          IA          O-V
         spaceallocation,charseq,parm2)
```

THE MERGEINIT INTRINSIC. The MERGEINIT syntax for a procedure call is:

```
                IA              P              IA              P              LV
MERGEINIT (inputfiles,preprocessor,outputfiles,postprocessor,keysonly,
             IV     IA     IA       LP         P          IA       L
          numkeys,keys,altseq,keycompare,errorproc,statistics,failure,
              I          I          IA              O-V
          errorparm,spaceallocation,charseq,parm2)
```

PARAMETERS. The following parameters apply:

numkeys and *keys*

The *numkeys* parameter is an integer. The *keys* parameter is an integer array. These parameters describe the way records are sorted or merged. One of these parameters cannot be specified without the other. The use of *numkeys* and *keys* disallows the use of *keycompare*. The number of keys used during the comparison of records is contained in *numkeys*, and the way records are compared is specified by *keys*. For each key specified, *keys* contains three words:

The first word gives the position of the first character of the key within the record. The second word gives the number of characters in the key. The third word (bits 0-7) gives the ordering sequence of the records (a value of 0 for ascending, 1 for descending). Bits 8-15 of the third word indicate the type of data according to the following convention:

0=logical or byte (same as type BYTE in interactive mode)

1=two's complement, including integer and double integer

2=floating point

3=packed decimal

4=Display-Trailing-Sign

5=packed decimal with even number of digits

6=Display-Leading-Sign

7=Display-Leading-Sign-Separate

8=Display-Trailing-Sign-Separate

9=character (collating sequence of *charseq* is used).

charseq A two-word integer array. To utilize *charseq*:

- Set word 0 to 1.
- Set word 1 to the *langnum* of the collating sequence to be used for sorting keys of type 9 (CHARACTER). The language designated must be configured on the system.

Whenever keys of type CHARACTER are compared, and *charseq* has been used to request a native language collating sequence (e.g., Dutch, Spanish, Danish), SORT or MERGE will call the NLCOLLATE intrinsic to do a native language comparison.

If NATIVE-3000 has been designated by the user or as a default, SORT-MERGE will do a direct byte comparison on keys of type CHARACTER. NATIVE-3000 is an artificial language whose collating sequence is based on the binary values of the characters.

ADDITIONAL INFORMATION. Refer to the SORT-MERGE/3000 Manual (32214-90002) for other parameter descriptions.

Error Messages

NLS-specific error messages include those for Programmatic SORT (Table 3-9), Interactive SORT (Table 3-10), Programmatic MERGE (Table 3-11) and Interactive MERGE (Table 3-12).

Table 3-9. Programmatic SORT Error Messages

29	LIB	SORT LANGUAGE NOT SUPPORTED.
30	LIB	NLINFO ERROR OBTAINING LENGTH OF COLLATING SEQUENCE TABLE.
31	LIB	NLINFO ERROR LOADING COLLATING SEQUENCE TABLE.
32	LIB	INVALID CHARSEQ PARAMETER.

Table 3-10. Interactive SORT Program Error Messages

40	INVALID LANGUAGE ID.
41	THE LANGUAGE SPECIFIED IS NOT SUPPORTED.

Table 3-11. Programmatic MERGE Error Messages

21	LIB	SORT LANGUAGE NOT SUPPORTED.
22	LIB	NLINFO ERROR OBTAINING LENGTH OF COLLATING SEQUENCE TABLE.
23	LIB	NLINFO ERROR LOADING COLLATING SEQUENCE TABLE.
24	LIB	INVALID CHARSEQ PARAMETER.

Table 3-12. Interactive MERGE Program Error Messages

37	INVALID LANGUAGE ID.
38	THE LANGUAGE SPECIFIED IS NOT SUPPORTED.

Performance Considerations

SORT-MERGE executes more slowly when keys of type CHARACTER and a native language collating sequence are requested. The complex collating algorithms required by some of the languages may use additional CPU time. The speed of SORT-MERGE is unchanged when a native language collating sequence is not requested, or when NATIVE-3000 is requested.

COBOLII Sorting And Merging

The syntax for the SORT and MERGE verbs has changed slightly for NLS. It is now possible to specify the native language whose collating sequence is to be used. The old syntax allowed only an alphabetic name:

```
[COLLATING SEQUENCE IS alphabet-name]
```

The syntax has been changed to:

```
                        {alphabetname   }
[COLLATING SEQUENCE IS  {languagename   } ]
                        {langnum        }
```

With the addition of NLS features, *alphabetname* retains the same meaning, *languagename* is an alphanumeric data item containing the name of the language whose collating sequence is to be used, and *langnum* is an integer data item containing the language identification number of the language to be used.

Figure 3-6 demonstrates the use of the SORT verb syntax:

```
002600 WORKING-STORAGE SECTION.
002700 01  AN-LANG-NAME  PIC X(16) VALUE "FRENCH"
002800 01  NUM-LANG-ID   PIC S9(4) COMP VALUE 7.

003300 SORT SORT-FILE
003400      ASCENDING KEY SORT-KEY
003500      COLLATING SEQUENCE IS AN-LANG-NAME
003600      USING IN-FILE
003700      GIVING OUT-FILE.

004000 SORT SORT-FILE
004100      ASCENDING KEY SORT-KEY
004200      COLLATING SEQUENCE IS NUM-LANG-ID
004300      USING IN-FILE
004400      GIVING OUT-FILE.

005000 SORT SORT-FILE
005100      ASCENDING KEY SORT-KEY
005300      USING IN-FILE
005400      GIVING OUT-FILE
```

Figure 3-6. SORT Verb Syntax

VPLUS

The VPLUS/3000 product consists of five major parts: Intrinsics, FORMSPEC, ENTRY, REFSPEC, and REFORMAT.

VPLUS/3000 Native Language Support (NLS) enables an applications designer to create interactive end-user applications which reflect both the user's native language and the local custom for numeric and date information in the supported languages. NLS provides these specific features in VPLUS/3000:

- Native decimal and thousands indicators.
- Native language month names for dates.
- Alphabetic upshifting of native characters.
- Native characters in single value comparisons and table checks.
- Native collating sequence in range checks.

VPLUS/3000 does not support the application design process in native languages. Form names, field identifiers, and field tags support only USASCII characters.

REFSPEC and REFORMAT do not use NLS features. These programs interact with users in NATIVE-3000 only.

Language Attribute

VPLUS/3000 contains an NLS language attribute option which allows the applications programmer to design an international or language-dependent forms file. If a native language attribute is not specified the forms file is unlocalized.

The forms file reflects the language characteristics of the application. Each forms file has a global language ID number. The application may be unlocalized, language-dependent, or international. For examples of these applications, see Figures 1-3, 1-4, and 1-5 in Section I, "INTRODUCTION TO NLS."

UNLOCALIZED. If no language ID number is assigned to a forms file, it will default to 0 (NATIVE-3000).

LANGUAGE-DEPENDENT. This application only operates in a single language context. The language ID number is assigned when the forms file is designed. If the text needs to be in the native language, unique versions of a forms file are required for each language supported.

INTERNATIONAL. Multinational corporations may need to maintain a business language for commands, titles, and menus in addition to accommodating the language of the end user for the actual data retrieved or displayed. For this application, select "-1" as the language ID number for the forms file. The VPLUS/3000 intrinsic VSETLANG must be called at run time to assign the appropriate language.

Setting The Language ID Number

The components of a form which can be language-dependent are the text, the initial values of fields, and the field edit rules. The language ID number determines the context for data editing, conversion, and formatting. The FORMSPEC language controls the context when the forms file is designed. The forms file language controls the context when the forms file is executed.

The forms designer sets language ID number values for the forms file via the FORMSPEC Terminal/Language Selection Menu. The forms file language defaults to 0 (NATIVE-3000) if no language ID number is specified for it. NATIVE-3000 is currently the only selection available for the FORMSPEC language. This means that initial values and processing specifications must be defined with the month names and numeric conventions of NATIVE-3000.

The designer can change the forms file language ID number at any time. The value must be a positive number or a zero for a single language application. If the value is acceptable, but the language is not configured, FORMSPEC will issue a warning message. The language ID number will not be rejected. The designer is prompted to confirm the value or change it.

For multiple language applications, the forms designer selects a forms file language ID number value of -1. The international language ID number indicates that the intrinsic VSETLANG will be called at run time to select the language ID number for the forms file. If an application uses an international forms file without calling VSETLANG, it will be executed in the default, NATIVE-3000. If VSETLANG is called for an unlocalized or language-dependent forms file, an error code will be returned.

The designer has three options in designing an application to work effectively with multiple languages:

- Develop several language-dependent forms files.
- Create one international forms file.
- Produce a combination of language-dependent files and an international forms file.

VGETLANG may be used to determine whether a language-dependent forms file or an international forms file is being executed. If VGETLANG indicates an international forms file, VSETLANG must be called to select the actual language. Refer to the VGETLANG and VSETLANG intrinsics at the end of this section.

Field Edits

NATIVE-3000 must be used to specify date and numeric fields within FORMSPEC. VPLUS/3000 will convert the value when the forms file is executed to be consistent with the native language selected. Single value comparisons (LT, LE, GT, GE, EQ, NE) table checks, and range checks (IN, NIN) specified within FORMSPEC may contain any character in the 8-bit extended character set consistent with the selected language ID number. When the form is executed at run time, the collating table for the native language specified is used to check whether the field is within a range.

DATE HANDLING. VPLUS supports several date formats and three date orders: MDY, DMY, YMD. Any format is acceptable as input when the form is executed, provided that the field length can accommodate the format. The forms designer specifies the order for each date-type field. With NLS, the native month names are edited and converted to numeric destinations. The format and the date order are not related to the language of the forms file.

NUMERIC DATA. Decimal and thousands indicators are language-dependent in the NUM[n] and IMPn fields. When data is moved between fields and automatic formatting occurs for data entered in any field, recognition, removal or insertion of these decimal and thousands indicators is language-dependent. The optional decimal symbol in constants is also language-dependent.

NOTE

VPLUS/3000 edit processing specifications and terminal edit processing statements are separate and are not checked for compatibility. There will be no check that the designer has specified a terminal local edit which is consistent with the language-dependent symbol for the decimal point (DEC_TYPE_EUR, DEC_TYPE_US) in the configuration phase.

NATIVE LANGUAGE CHARACTERS. If a native language ID number has been specified in the forms file, the UPSHIFT formatting statement will use native language upshift tables.

Range checks and the single value comparisons LT, LE, GT and GE involve collating sequences. When the form is executed, the native language collating sequence table designated by the language ID number is used to check whether the field passes the edit.

NLS features in VPLUS/3000 do not include support for pattern matching with native characters. MATCH uses USASCII specifications.

Entry And Language ID Number

The forms file language determines the user language in ENTRY unless the file is international (-1). The ENTRY program uses the intrinsic VGETLANG to identify the language of the forms file selected by the designer.

If the forms file is international, ENTRY calls the NLS intrinsic NLGETLANG (mode 1). If it returns a value of UNKNOWN, the user is prompted for a language ID number. Once a valid language ID number is determined, ENTRY calls the VSETLANG intrinsic to specify the corresponding language.

The batch file does not have a language indicator. Users with different native languages may collect data in the same batch file if the associated forms file is international.

Error Messages

VPLUS/3000 Error Messages are listed in Table 3-13.

Table 3-13. VPLUS/3000 Error Messages

NUMBER	MESSAGE	ACTION
9001	NATIVE LANGUAGE SUPPORT SOFTWARE NOT INSTALLED.	Ask the System Manager to install NLS software.
9002	LANGUAGE SPECIFIED IS NOT CONFIGURED ON THIS SYSTEM.	Select another language or ask the System Manager to configure the desired language.
9011	WARNING: LANGUAGE NOT CONFIGURED. CHANGE OR HIT "ENTER" TO PROCEED.	Language specified is not configured on the system. Forms file produced can only be executed on a system configured with that language.
9014	ATTEMPTED SETTING A LANGUAGE DEPENDENT FORMS FILE TO ANOTHER LANGUAGE.	VSETLANG can only be used with international forms files.
9015	NATIVE-3000 IS CURRENTLY THE ONLY SELECTION AVAILABLE.	FORMSPEC language can only be 0 in this version.
9500	LANGUAGE OF FORMS FILE IS NOT CONFIGURED ON THIS SYSTEM.	Ask the System Manager to configure the language or use forms file on a system with that language configured.
9998	LANGUAGE ID MUST BE 0 TO 999 OR -1 FOR INTERNATIONAL FORMS FILE.	Forms file language ID number must be between -1 and 999.

VPLUS Intrinsics

The VGETLANG and VSETLANG intrinsics are used only with the VPLUS/3000 subsystem. Intrinsic calls in VPLUS/3000 are usually in COBOL. Refer to the VGETLANG and VSETLANG sections for examples of calls in other programming languages.

VGETLANG

The VGETLANG intrinsic returns the language ID number of the forms file.

SYNTAX

```
CALL "VGETLANG" USING COMAREA,LANGNUM
```

This intrinsic returns the language ID number of the forms file being executed. The forms file must be opened before calling VGETLANG. Otherwise, CSTATUS returns a nonzero value.

PARAMETERS

COMAREA — The following COMAREA fields must be set before calling VGETLANG if not already set:

LANGUAGE	Set to code identifying the programming language of the calling program.
COMAREALEN	Set to total number of words in COMAREA.

VGETLANG may set the following COMAREA fields:

CSTATUS	Set to nonzero value if call is unsuccessful.

LANGNUM — Integer variable to which the language ID number of the forms file is returned.

EXAMPLE

The following examples illustrate a call to VGETLANG:

COBOL: CALL "VGETLANG" USING COMAREA,LANGNUM.

BASIC: 120 CALL VGETLANG(C(*),L)

FORTRAN: CALL VGETLANG (COMAREA,LANGNUM)

SPL: VGETLANG (COMAREA,LANGNUM);

SPECIAL CONSIDERATIONS

This intrinsic is used only in the VPLUS/3000 subsystem.

VSETLANG

The VSETLANG intrinsic specifies the native language to be used with an international forms file.

SYNTAX

```
CALL "VSETLANG" USING COMAREA,LANGNUM,ERROR
```

This intrinsic sets the language to be used by VPLUS/3000 at run time for an international forms file. The forms file must be opened before calling VSETLANG. Otherwise, CSTATUS returns a nonzero value.

If VSETLANG is called to set the language ID number for a language-dependent or unlocalized forms file, an error code of -1 will be returned to ERROR. For international forms files, both CSTATUS and ERROR return a value of zero and the forms file is processed with the native language ID number specified in LANGNUM.

PARAMETERS

COMAREA — The following COMAREA fields must be set before calling VSETLANG (if not already set):

LANGUAGE	Set to code identifying the programming language of the calling language.
COMAREALEN	Set to total number of words in COMAREA.

VSETLANG may set the following COMAREA fields:

CSTATUS	Set to nonzero value if call is unsuccessful.

LANGNUM — An integer containing the ID number of the language to be used by VPLUS/3000.

ERROR — Integer to which the error code is returned. Zero means the call was successfully completed. A value of -1 is returned if the call is unsuccessful.

EXAMPLE

The following examples illustrate a call to VSETLANG:

COBOL: CALL "VSETLANG" USING COMAREA,LANGNUM,ERROR.

BASIC: 120 CALL VSETLANG(C(*),L,E)

FORTRAN: CALL VSETLANG (COMAREA,LANGNUM,ERROR)

SPL: VSETLANG (COMAREA,LANGNUM,ERROR);

SPECIAL CONSIDERATIONS

This intrinsic is used only in the VPLUS/3000 subsystem.

NATIVE LANGUAGE INTRINSICS

SECTION IV

The following categories of intrinsics are used by Native Language Support (NLS).

Information Retrieving:

ALMANAC	Returns numeric date information.
NLGETLANG	Returns the current language.
NLINFO	Returns language-dependent information.

Character Handling:

NLCOLLATE	Compares two character strings.
NLKEYCOMPARE	Compares strings of different length.
NLREPCHAR	Replaces nondisplayable characters.
NLSCANMOVE	Moves and scans character strings.
NLTRANSLATE	Translates strings from and to EBCDIC.

Time/Date Formatting:

NLCONVCLOCK	Converts the time format.
NLCONVCUSTDATE	Converts the custom date format.
NLFMTCALENDAR	Formats the date.
NLFMTCLOCK	Formats the time.
NLFMTCUSTDATE	Formats the date into custom date format.
NLFMTDATE	Formats date and time.

Application Message Catalog:

CATCLOSE	Closes a message catalog.
CATOPEN	Opens a message catalog.
CATREAD	Reads information from a message catalog.
NLAPPEND	Concatenates a file name and a language number.

NLS Date And Time Formatting Overview

Figure 4-1 shows the results of using NLS intrinsics when formatting date and time.

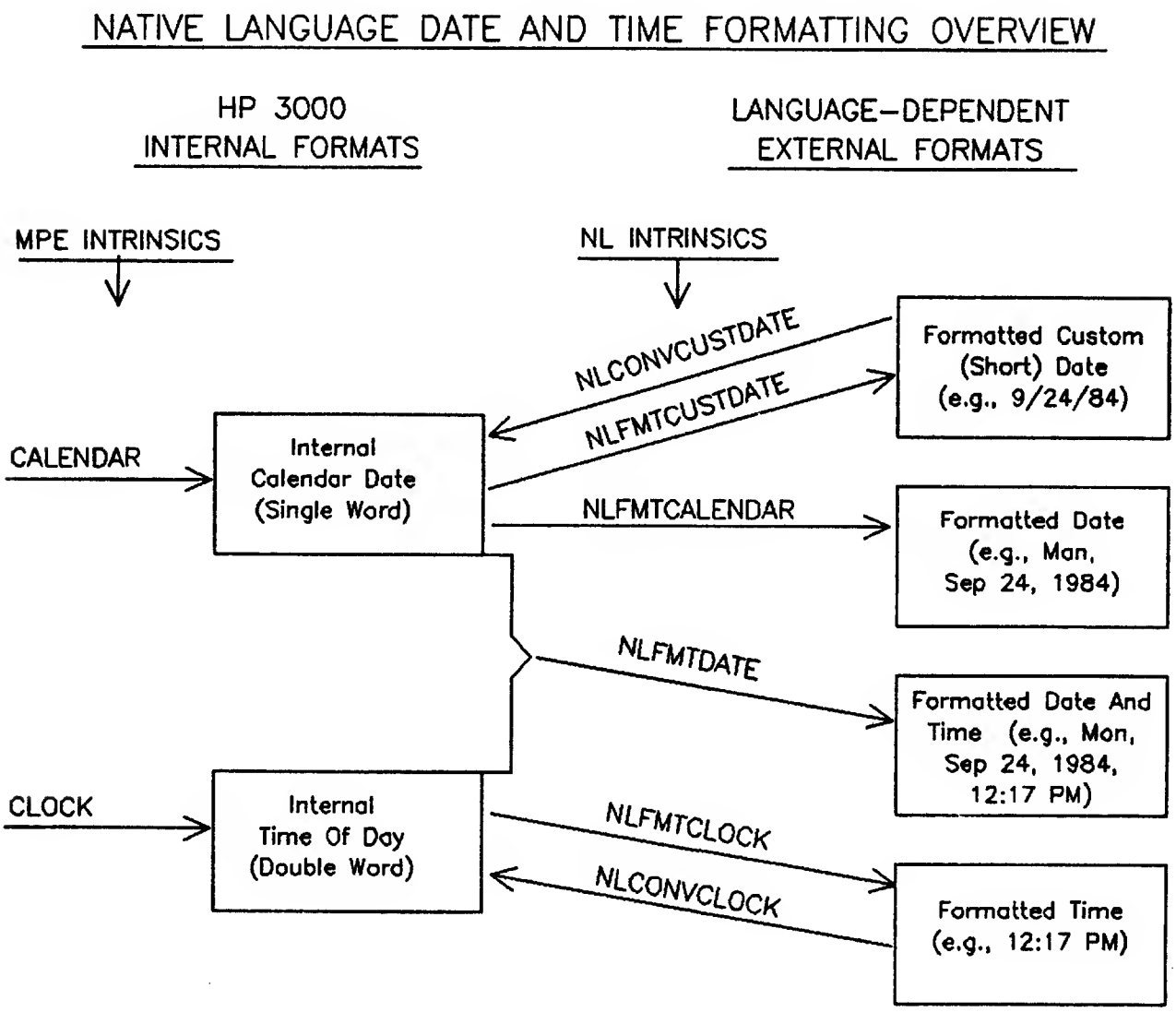


Figure 4-1. Date And Time Formatting Overview

ALMANAC

INTRINSIC NUMBER 406

Returns numeric date information.

SYNTAX

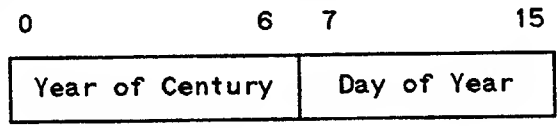
```
                LV   LA      I         I         I         I              0-V
ALMANAC (date,error,yearnum,monthnum,daynum,weekdaynum);
```

This intrinsic returns the numeric date information for a date returned by the CALENDAR intrinsic. The returned information is year of the century, month of the year, day of the month, and day of the week.

PARAMETERS

date

logical by value (required)
A logical containing the date in the format:



error

logical array (required)
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1	No parameters available for returning values.
2	Day of the year out of range.
3	Year of the century out of range.

yearnum

integer by reference (optional)
An integer to which the year of the century is returned. For example, 00=1900, 84=1984.

monthnum

integer by reference (optional)
An integer to which the month of the year is returned. For example, 1=January, 12=December.

daynum — *integer by reference (optional)*
An integer to which the day of the month is returned.

weekdaynum — *integer by reference (optional)*
An integer to which the day of the week is returned. For example, 1=Sunday, 7=Saturday.

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs D and E in Appendix H, "EXAMPLE PROGRAMS."

CATCLOSE

INTRINSIC NUMBER 417

Closes the specified application message catalog file.

SYNTAX

```
                D       LA
CATCLOSE (catindex,error)
```

The CATCLOSE intrinsic is for use with the application message facility.

PARAMETERS

catindex — *double by value (required)*
The catalog index returned by the CATOPEN intrinsic.

error — *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1	Close of catalog file failed.
100	Internal message facility error.

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program L in Appendix H, "EXAMPLE PROGRAMS."

CATOPEN

INTRINSIC NUMBER 415

Opens the specified application message file.

SYNTAX

```
    D                          BA          LA
catindex:=CATOPEN (formaldesignator,error);
```

The CATOPEN intrinsic must be used with the application message facility.

FUNCTIONAL RETURNS

A catalog index double is returned (an internal value recognized by the CATREAD and CATCLOSE intrinsics). This is not a file number.

PARAMETERS

formaldesignator — *byte array (required)*
Contains a string of USASCII characters that identify the catalog file to the system. This string must be terminated by any USASCII special character except a slash or a period.

error — *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1	Open failed on catalog file.
2	Could not access catalog file.
3	File specified is not a GENCAT formatted catalog.
100	Internal message facility error.

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program L in Appendix H, "EXAMPLE PROGRAMS."

CATREAD

INTRINSIC NUMBER 416

Reads the specified catalog and returns (or sends) the text as specified.

SYNTAX

```
  I                    D        IV      IV       LA     BA      IV
msglen:=CATREAD (catindex,setnum,msgnum,error,buff,buffsize,
                     BA     BA     BA     BA       BA      IV              O-V
                  parm1,parm2,parm3,parm4,parm5,msgdest);
```

The CATREAD intrinsic provides access to the application message facility. It only accesses catalogs opened with the CATOPEN intrinsic. The NLS application message catalog facility is discussed in Section II, "APPLICATION MESSAGE FACILITY."

FUNCTIONAL RETURNS

The length of the message is returned to *msglen* (in positive bytes).

PARAMETERS

catindex — *double by value (required)*
An index returned by CATOPEN which specifies the catalog to be used.

setnum — *integer by value (required)*
A positive integer no greater than 255 specifying the set number within the catalog.

msgnum — *integer by value (required)*
A positive integer no greater than 32766 specifying the message number within the message set.

error — *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1	Invalid *catindex* specified.
2	Read failed on catalog file.
3	Set not found.
4	Message not found.
6	User buffer overflow.
7	Write failed to *msgdest* file.
14	Set < = 0 specified.
15	Set > 255 specified.
16	Message number < 0 specified.
17	Message number > 32766 specified.
18	Specifies *buflen* < = 0.
19	Specifies *msgdest* < 0.
100	Internal message facility error.

buff — *byte array (optional)*
A byte array to which the assembled message is returned.

buffsize — *integer by value (optional)*
When specified, this is the buffer length in bytes. If *buff* is not specified, this is the length (in bytes) of the records to be written to the destination file. (Default = 72 bytes.)

parm1-parm5 — *byte arrays (optional)*
Parameters to be inserted into message. These must always point to a character string. The strings must be terminated by a binary zero.

msgdest — *integer by value (optional)*
Integer value specifying the destination of the assembled message (0 = $STDLIST, >2 = file number of destination file. Default = $STDLIST if *buff* not specified and no file if specified).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program L in Appendix H, "EXAMPLE PROGRAMS."

NLAPPEND

INTRINSIC NUMBER 412

Appends the appropriate language ID number to a file name.

SYNTAX

```
                    BA              IV      LA
NLAPPEND (formaldesignator,langnum,error);
```

The NLAPPEND intrinsic allows an application to designate which of several language-dependent files (e.g., application message catalogs or VPLUS forms files) should be used by appending the language ID number to the file name. (This assumes that the application uses this naming convention for its language-dependent files.)

PARAMETERS

formaldesignator — *byte array (required)*
Contains a string of USASCII characters interpreted as part of a formal file designator. The file name must end with three blanks.

langnum — *integer by value (required)*
An integer specifying the language ID number of the catalog to be opened.

error — *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid file name.
4	File name not terminated by three blanks.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls not permitted.

NLCOLLATE

INTRINSIC NUMBER 402

Compares two character strings in a language-dependent manner.

SYNTAX

```
                BA       BA      IV      I        IV       LA      LA       0-V
NLCOLLATE (string1,string2,length,result,langnum,error,collseq);
```

This intrinsic collates two character strings according to the collating sequence of the specified language. Its purpose is to determine a lexical ordering. It is not intended to be used for searching or matching. To determine whether two strings are equal, use the **COMPARE BYTES** machine instruction.

PARAMETERS

string1 *byte array (required)*
One of two character strings to be collated.

string2 *byte array (required)*
The other character string to be collated.

length *integer by value (required)*
The length (in bytes) of the string segments to be collated.

result *integer by reference (required)*
The result of the character string collating:

0	If *string1* collates equal to *string2*.
-1	If *string1* collates before *string2*.
1	If *string1* collates after *string2*.

Result will be 0 if a nonzero error is returned.

langnum *integer by value (required)*
The language ID number indicating the collating sequence to be used.

error *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid collating table entry.
4	Invalid *length* parameter.
5*	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

collseq *logical array (optional)*
An array containing the native language collating sequence table as returned by NLINFO, item 11. This parameter is required for split-stack calls. If this parameter is present, *langnum* will be ignored and this routine will be much more efficient.

OPERATION

If the *collseq* parameter is omitted, and *langnum* is specified as (or defaults to) a language which collates by binary encoding, the COMPARE BYTES machine instruction will be used to compare the two indicated strings. Otherwise, the *collseq* array will be used to determine the string compare operation (note that this may be a COMPARE BYTES). Refer to the NLINFO intrinsic items 11 and 27.

SPECIAL CONSIDERATIONS

Split-stack calls are permitted.

NLCONVCLOCK

INTRINSIC NUMBER 409

Checks validity of the string by using the formatting template returned by NLINFO item 3, then converts the time to the general time format returned by the CLOCK intrinsic. This intrinsic is the inverse of NLFMTCLOCK.

SYNTAX

```
 D                        BA        IV        IV      LA
time:=NLCONVCLOCK (string,stringlen,langnum,error);
```

FUNCTIONAL RETURNS

The intrinsic returns the time in the format:

Bits 0 7 8 15

Hour of Day	Minute of Hour
Seconds	Tenths of Seconds

NOTE

Seconds and tenths of seconds will always be zero.

PARAMETERS

string *byte array (required)*
A character string containing the time to be converted.

stringlen *integer by value (required)*
A positive integer specifying the length of the string (in bytes).

langnum *integer by value (required)*
An integer which contains the language ID number specifying the custom time format which has to be matched by the string.

error *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid time string.
4	Invalid length.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs D and E in Appendix H, "EXAMPLE PROGRAMS." See Figure 4-1 for an illustration of the relationship between the various date and time handling intrinsics.

NLCONVCUSTDATE

INTRINSIC NUMBER 408

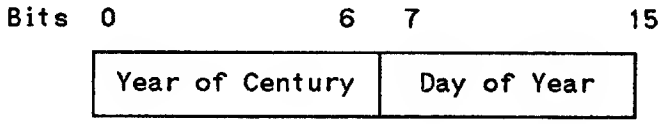
Checks the validity of a string by using the formatting template returned by NLINFO item 2, then converts the date to the general date format as returned by the CALENDAR intrinsic. This intrinsic is the inverse of NLFMTCUSTDATE.

SYNTAX

```
 L                          BA       IV         IV    LA
date:=NLCONVCUSTDATE (string,stringlen,langnum,error);
```

FUNCTIONAL RETURNS

The intrinsic returns the date in the format:



PARAMETERS

string *byte array (required)*
A character string containing the date to be converted. Leading and trailing blanks will be disregarded.

stringlen *integer by value (required)*
A positive integer specifying the length of the string (in bytes).

langnum *integer by value (required)*
An integer which contains the language ID number specifying the custom date format which has to be matched by the string.

error *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid date string.
4	Invalid string length.
5 *	NLS internal error.
6 *	NLS internal error.
7	Separator character in *string* doesn't match separator in the custom date template.
8	The length of the date string is more than 13 characters (excluding leading and trailing blanks).

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs D and E in Appendix H, "EXAMPLE PROGRAMS." See Figure 4-1 for an illustration of the relationship between the various date and time handling intrinsics.

NLFMTCALENDAR

INTRINSIC NUMBER 413

Formats the supplied date according to the language-dependent calendar template. The formatting is done according to the template returned by NLINFO item 1.

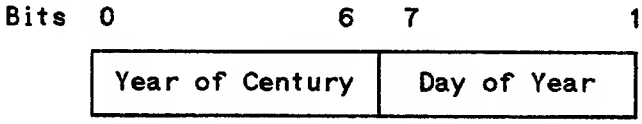
SYNTAX

```
                    LV    BA      IV     LA
NLFMTCALENDAR (date,string,langnum,error);
```

PARAMETERS

date — *logical by value (required)*

A logical value indicating the date in the format as returned by the CALENDAR intrinsic:



string — *byte array (required)*

A character string in which the formatted date is returned. This string will be 18 characters long, padded with blanks if necessary.

langnum — *integer by value (required)*

An integer containing the language ID number indicating the calendar template to be used. A *langnum* of 0 will return the date formatted as though FMTCALENDAR were used. (For example, FRI, OCT 1, 1982.)

error — *logical array (required)*

The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid date value.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs D and E in Appendix H, "EXAMPLE PROGRAMS." See Figure 4-1 for an illustration of the relationship between the various date and time handling intrinsics.

NLFMTCLOCK

INTRINSIC NUMBER 410

Formats the time of day obtained with the CLOCK intrinsic. The specified language will determine the format. The template (clock format description) returned by NLINFO item 3 will be used.

SYNTAX

```
                DV    BA      IV     LA
NLFMTCLOCK (time,string,langnum,error);
```

PARAMETERS

time

double by value (required)
A double word value containing the time in the format as returned by the CLOCK intrinsic:

Bits 0 7 8 15

Hour of Day	Minute of Hour
Seconds	Tenths of Seconds

string

byte array (required)
An eight-character byte array in which the formatted time of day is returned.

langnum

integer by value (required)
An ID number specifying which language-specific format is to be used. A *langnum* of 0 will return the time formatted as though FMTCLOCK were used.

error

logical array (required)
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid time format.
4 *	NLS internal error.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs D and E of Appendix H, "EXAMPLE PROGRAMS." See Figure 4-1 for an illustration of the relationship between the various date and time handling intrinsics.

NLFMTCUSTDATE

INTRINSIC NUMBER 407

Formats the general date format returned by the CALENDAR intrinsic to the custom date format for a native language. A custom date is an abbreviated format such as "10/1/82" or "82.10.1." The formatting is done according to the template returned by NLINFO item 2.

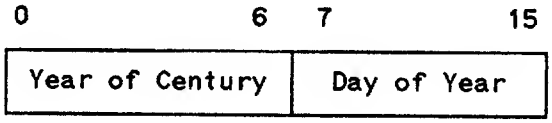
SYNTAX

```
                    LV   BA      IV      LA
NLFMTCUSTDATE (date,string,langnum,error);
```

PARAMETERS

date — *logical by value (required)*

A logical value containing the date in the format as returned by the CALENDAR intrinsic:



string — *byte array (required)*

A 13-character byte array to which the formatted date is returned.

langnum — *integer by value (required)*

An ID number of the language whose custom date template is to be used for the formatting. A *langnum* of 0 will return the time formatted as though FMTCLOCK were used.

error — *logical array (required)*

The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid date value.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to examples D and E in Appendix H, "EXAMPLE PROGRAMS." See Figure 4-1 for an illustration of the relationship between the various date and time handling intrinsics.

NLFMTDATE

INTRINSIC NUMBER 414

Formats the specified date and time according to the concatenation of the templates returned by NLINFO items 1 and 3.

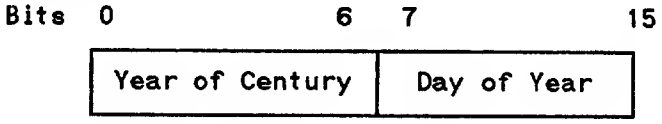
SYNTAX

```
                LV   DV      BA      IV      LA
NLFMTDATE (date,time,string,langnum,error);
```

PARAMETERS

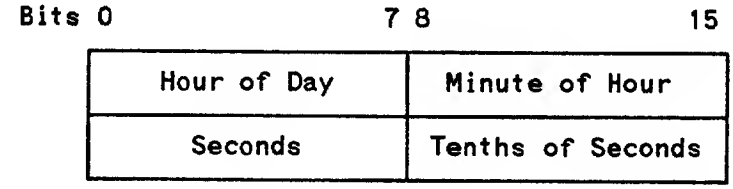
date *logical by value (required)*

A logical value indicating the date in the format as returned by the CALENDAR intrinsic:



time *double by value (required)*

A double word value indicating the time to be formatted. The double word is in the format returned by the CLOCK intrinsic:



string *byte array (required)*

A 28-character string in which the formatted date and time are returned.

langnum *integer by value (required)*

A language ID number designating the formatting templates to be used. A *langnum* of 0 will return the date/time string as though FMTDATE were used. (For example: MON, FEB 7, 1983 9:00 AM.)

error *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid date value.
4	Invalid time value.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program K in Appendix H, "EXAMPLE PROGRAMS." See Figure 4-1 for an illustration of the relationship between the various date and time handling intrinsics.

NLGETLANG

INTRINSIC NUMBER 411

Returns current language information.

SYNTAX

```
    I                       IV      LA
langnum:=NLGETLANG (function,error);
```

This intrinsic returns a language ID number which characterizes the current user, data, or system. It is intended for use by Hewlett-Packard subsystems (programs, not intrinsics) or by applications programs so they can automatically configure themselves. Refer to "SPECIAL CONSIDERATIONS" for a description of where NLGETLANG derives its information.

FUNCTIONAL RETURNS

The language ID number (*langnum*) of the current user, data, or system. In the event of an error, an integer value of 0 (i.e., NATIVE-3000) is always returned to *langnum*.

PARAMETERS

function — *integer by value (required)*

An integer containing the function number indicating which type of language ID number should be returned. The possible values are:

1 The user-interface language. This is used to specify the language to be used for communication between the program and the user.

2 The data language. This is an attribute which determines how various language-dependent data manipulation functions (e.g., sorting, upshifting) should be performed by the subsystem.

3 The system default language.

error — *logical array (required)*

The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1	NLS is not installed.
2	NLGETLANG found the language requested, but it was not configured on the system.
3	Invalid *function* value.
4	No language specified for NLGETLANG to access.

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

The NLGETLANG intrinsic will locate the language ID numbers requested by *function* 1 and 2 by referring to the Hewlett-Packard defined Job Control Words (JCWs) NLUSERLANG and NLDATALANG respectively. If the required JCW does not exist, or has a value greater than or equal to FATAL (32768), Error #4 is returned.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program K in Appendix H, "EXAMPLE PROGRAMS."

NLINFO

INTRINSIC NUMBER 400

This intrinsic returns language-dependent information.

SYNTAX

```
                IV          LA          I       LA
NLINFO (itemnumber,itemvalue,langnum,error);
```

PARAMETERS

itemnumber *integer by value (required)*
Positive integer which specifies the *itemvalue* to return.

itemvalue *type of variable depends on itemnumber (required)*
Return variable for information requested; or (if *itemnumber* is 22 or 24) the language name or number about which information is requested.

The following is a list of the currently defined *itemnumbers*, and the data types and information returned to *itemvalue*.

Item #	Type	Description of *itemvalue*
1	LA	An 18-character array to which the calendar format is returned. The 18 characters of the string for this definition are interpreted as the format description for that language.

The following descriptors are valid:

D	One-character day abbreviation.
DD	Two-character day abbreviation.
DDD	Three-character day abbreviation.
M	One-character month abbreviation.
MM	Two-character month abbreviation.
MMM	Three-character month abbreviation.
MMMM	Four-character month abbreviation.
mm	Numeric month of the year.
dd	Numeric day of the month.
yy	Numeric year of the century.
yyyy	Numeric year.
Nyy	National year.

Valid separators are any special character.

For example, a format may be: DDD, MMM dd, yyyy. Using this format in NATIVE-3000 would result in: FRI, MAY 25, 1984.

2 LA A 13-character array to which the custom date format is returned. The 13 characters of the string for this definition are interpreted as the custom date format description.

The following descriptors are valid:

mm	Numeric month of the year.
dd	Numeric day of the month.
yy	Numeric year of the century.
yyyy	Numeric year.
Nyy	National year.

Valid separators are any special character. For instance, a date format might be: yy/mm/dd. An example of this format in NATIVE-3000: 81/03/25.

3 LA An eight-character array to which the clock specification is returned. This eight-character string provides the clock format description (template):

HHSXXYYZ with:

HH	Clock hour specification, either "12" or "24".
S	Separator. Valid separators may be any special or alpha character, or "0" if no separator between hours and minutes should appear.
XX	Symbol for AM.
YY	Symbol for PM.
Z	Suppresses leading zero (of hours) if blank; prints leading zero if 0.

In suppression of leading zero, " " (leading zero suppressed) or "0" (leading zero will be printed) are valid. For example, the format "12:AMPM " would yield formatted clock information in the form: 9:06 AM. The leading zero is suppressed.

If the clock specification were changed to "240 0", the formatted clock information for the same time would be: 0906. Note the four blanks used as place holders to ensure the correct placement of the leading-zero suppression character.

4 LA A 48-character array to which the month abbreviation table is returned. Each abbreviation is four characters long, using blank padding where necessary to maintain uniform length in all native language abbreviations. For example, the NATIVE-3000 abbreviations contain three characters plus a blank. The first four characters of the array contain the abbreviation of January.

The month abbreviation table for NATIVE-3000 would be:
"JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC "

5 LA A 144-character array in which the month table is returned. Each month's name can be up to 12 characters long. Unused space in each month name is padded with blanks where necessary to equal 12 characters. The table begins with the language-dependent equivalent in the native language specified for January.

For example, the month name table for NATIVE-3000 would be:
"JANUARY FEBRUARY MARCH ...DECEMBER "

6 LA A 21-character array in which the day abbreviation table is returned. Each abbreviation is three characters long. The table begins with Sunday.

For example, the day abbreviation table for NATIVE-3000 would be:
"SUNMONTUEWEDTHUFRISAT"

7 LA An 84-character array in which the table containing the day of the week is returned. Each day is 12 characters long (with blank padding as needed). The table starts with Sunday.

For example, the day name table for NATIVE-3000 would be:
"SUNDAY MONDAY TUESDAY ... SATURDAY "

8 LA A 12-character array to which the YES/NO responses are returned. The first six characters contain the (upshifted) "YES" response; the second six the (upshifted) "NO" response.

9 LA A two-character array to which the symbols for decimal separator and thousands indicator are returned. The first character contains the decimal separator, the second contains the thousands indicator.

10 LA A six-character array to which the currency signs are returned. The first character represents the short currency symbol (if any) used for business formats; the second character is a flag that indicates whether the currency symbol precedes or succeeds the number and also whether the currency symbol is preceded or succeeded by blanks. The last four characters contain the full currency symbol. The layout of the second character is as follows:

bits 0:4	0	The currency symbol has no blanks preceding or succeeding it.
	1	The currency symbol has a blank preceding it.
	2	The currency symbol has a blank succeeding it.
	3	The currency symbol has blanks preceding and succeeding it.
bits 4:4	0	The currency symbol precedes the number.
	1	The currency symbol succeeds the number.
	2	The currency symbol replaces the decimal separator.

11 LA An array to which the collating sequence table is returned. A call to NLINFO item 27 determines the length of this array based on the length of the table of the native language specified.

12	LA	A 256-character array to which the character set attribute table is returned. Each character will contain the numeric identification of the character type: 0 Numeric character. 1 Alphabetic lowercase character. 2 Alphabetic uppercase character. 3 Undefined graphic character. 4 Special character. 5 Control code.
13	LA	A 256-character array to which the ASCII-to-EBCDIC translation table is returned.
14	LA	A 256-character array to which the EBCDIC-to-ASCII translation table is returned.
15	LA	A 256-character array to which the upshift table is returned.
16	LA	A 256-character array to which the downshift table is returned.
17	LA	A logical array to which the language numbers of all configured languages are returned. The first word of this array contains the number of configured languages. The second word contains the language number of the first configured language. The third word contains the language number of the second configured language, etc. (The *langnum* parameter is disregarded.)
18	L	A logical to which true (-1) is returned if the specified language is supported (configured) on the system. Otherwise, false (0) is returned.
19	I	An integer to which the character set ID number supporting the specified language is returned.
20	LA	A 16-character array to which the uppercase name of the character set supporting the specified language is returned. If the name contains fewer than 16 characters, it will be padded with blanks.
21	LA	A 16-character array to which the uppercase name of the specified language is returned. If the name contains fewer than 16 characters, it will be padded with blanks.
22	LA	The *itemvalue* is a logical array containing a language name or number (in ASCII digits) terminated by a blank. The array must be at least eight words in length. The associated language ID number will be returned to *langnum*.
23	L	A logical to which true (-1) is returned if the character set specified is supported (configured) on the system. Otherwise, false (0) is returned.
24	LA	The *itemvalue* is a logical array containing a character set name or number (in ASCII digits) terminated by a blank. The required length of this array is eight words or more. The associated character set ID number will be returned to *langnum*.

25	LA	A 16-character array to which the uppercase name of the specified character set is returned. The *langnum* parameter must contain the ID number of the character set. If the name contains fewer than 16 characters, it will be padded with blanks.
26	I	An integer to which the class number of the specified language is returned.
27	I	An integer to which the length (in words) of the collating sequence table of the specified language is returned.
28	I	An integer to which the length (in words) of the national-dependent information table is returned. If no national table exists for the specified language, Error #4 is returned.
29	LA	A logical array to which the national-dependent information table is returned. To determine the size of this array, the length must first be obtained with a call to NLINFO item 28.

langnum *integer by reference (required)*
The language or character set identification number for the information requested.

error *logical array (required)*
This two-word array contains the error number in the first word. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3 *	Specified character set is not configured.
4	No national table is present.
5 *	NLS internal error.
6 *	NLS internal error.
7-9	Reserved.
10	The *itemnumber* is out of range.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

SPECIAL CONSIDERATIONS

Split-stack calls are permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs D, E, F, G and H in Appendix H, 'EXAMPLE PROGRAMS."

NLKEYCOMPARE

INTRINSIC NUMBER 405

Compares two strings of different length. For use with KSAM generic key searching.

SYNTAX

```
                    BA     IV     BA    IV       I      IV      LA      LA     0-V
NLKEYCOMPARE (genkey,length1,key,length2,result,langnum,error,collseq);
```

This intrinsic gives the KSAM user the ability to determine whether the key of a record matches the generic key specified. It should be used when reading a KSAM file in key sequential order in combination with FREAD, after a FFINDBYKEY call.

The NLKEYCOMPARE intrinsic allows a program to determine whether a generic key search found an exact match (i.e., the generic key is exactly equal to the beginning of the key, and not almost equal because of priority (e.g.,uppercase versus lowercase or accent). It also allows the program to determine whether an exactly matching key could be farther along the key sequence.

PARAMETERS

genkey *byte array (required)*
Contains the generic key to be compared to the keys contained in the record read by FREAD.

length1 *integer by value (required)*
The length in bytes of *genkey*, which must be less than *length2*.

key *byte array (required)*
This contains an entire key to which the user wants to compare *genkey*.

length2 *integer by value (required)*
The length in bytes of *key*, which must be greater than *length1*.

result *integer by reference (required)*
The result of the compare:

0	The retrieved key matches the generic key exactly for a length of *length1*.
1	The retrieved key does not match the generic key: it is different only because of priority (e.g., uppercase versus lowercase characters or accent). The FREAD key is still in range. This means that records may follow whose key matches the generic key exactly.

2 The retrieved key is less than the generic one (its collating order precedes the key specified). It does not match *genkey*. This means the FREAD call found a record which precedes the range requested. Records which match *genkey* may follow.

3 The retrieved key is greater than the generic key (it collates after the specified key). This means that the FREAD call found a record whose key follows the specified range. No records matching *genkey* follow.

langnum *integer by value (required)*
The language ID number indicating the collating sequence to be used for the compare.

error *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid collating table entry.
4	Invalid *length* parameter.
5*	NLS internal error.
6*	NLS internal error.
7	Value of *length1* is not less than *length2*.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

collseq *logical array (optional)*
An array containing the collating sequence table as returned by NLINFO item 11. This parameter is required for split-stack calls. If this parameter is present, *langnum* will be ignored and this routine will be much more efficient.

SPECIAL CONSIDERATIONS

Split-stack calls are permitted. NLKEYCOMPARE is intended for use with the KSAM subsystem.

ADDITIONAL INFORMATION

For example calls of this intrinsic refer to Programs I and J in Appendix H, "EXAMPLE PROGRAMS."

NLREPCHAR

INTRINSIC NUMBER 403

Replaces nondisplayable characters of a string.

SYNTAX

```
                BA     BA          IV          BV        IV      LA      LA      O-V
NLREPCHAR (instr,outstr,stringlength,repchar,langnum,error,charset);
```

This intrinsic replaces all nondisplayable control characters in the string with the replacement character. Nondisplayable characters are those with attribute 3 (undefined graphic character) or 5 (control code), as returned by NLINFO item 12.

PARAMETERS

instr — *byte array (required)*
A byte array in which the nondisplayable characters have to be replaced.

outstr — *byte array (required)*
A byte array to which the replaced character string is returned.

stringlength — *integer by value (required)*
A positive integer specifying the length (in bytes) of *instring*.

repchar — *byte value (required)*
A byte specifying the replacement character to be used.

langnum — *integer by value (required)*
An integer value specifying the language ID number of the language that determines the character set to be used.

error — *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid replacement character.
4	Invalid *length* parameter.
5 *	NLS internal error.
6 *	NLS internal error.
7	Invalid charset table entry.
8	Overlapping strings, *outstring* would overwrite *instring*.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

charset *logical array (optional)*
Contains the character set definition for the language to be used, as returned in NLINFO item 12. If this parameter is present, *langnum* will be ignored and this intrinsic will be much more efficient.

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program H in Appendix H, "EXAMPLE PROGRAMS."

NLSCANMOVE

INTRINSIC NUMBER 401

Moves and scans character strings according to character attributes.

SYNTAX

```
   I                          BA          BA     LV      IV
numchar:=NLSCANMOVE (instring,outstring,flags,length,
                                IV     LA     LA      LA          O-V
                     langnum,error,charset,shift);
```

The machine instructions (and the SPL constructs) for SCAN and MOVE used for upshifting or in conjunction with the alphabetic, numeric or special characters will only work for NATIVE-3000. This intrinsic will handle this function in a language-dependent manner.

FUNCTIONAL RETURNS

The number of characters acted upon in the SCAN or MOVE operation.

PARAMETERS

instring — *byte array (required)*
A character string which will act as the source string of the SCAN/MOVE.

outstring — *byte array (required)*
A character string which will act as the target.

NOTE

If *outstring* and *instring* are the same string, this intrinsic will act as SCAN. Otherwise, a MOVE will be performed. (Refer to Error #3.)

flags — *logical by value (required)*
A flag defining the options for calling the intrinsic. This parameter always defines the condition for terminating the SCAN/MOVE operation.

bits 14:2 Alphabetic. NLINFO item 12, types 1 (alphabetic lowercase character) and 2 (alphabetic uppercase character).

1 Lowercase.
2 Uppercase.
3 Uppercase or lowercase.

bits 13:1 Numeric. NLINFO item 12, type 0.

bits 12:1 Special. NLINFO item 12, types 3 (undefined graphic character), 4 (special character), or 5 (control code).

bits 11:1 WHILE/UNTIL option. If this bit is zero, then SCAN/MOVE is performed while the condition specified by (*flags* (12:4)) is true. If this bit is one, SCAN/MOVE is performed until the condition specified by (*flags* (12:4)) is true.

bits 9:2 Shift.

1 Upshift.
2 Downshift.

bits 0:9 Reserved. These bits of the *flags* parameter are reserved and must be zero.

length *integer by value (required)*
An integer indicating the maximum number of characters to be acted upon during the indicated operation.

langnum *integer by value (required)*
An integer containing the language ID number which implies both the character set definitions of character attributes and the language-specific shift.

error *logical array (required)*
The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Overlapping strings; *instring* would have been overwritten by *outstring*.
4	Invalid *length* parameter.
5 *	NLS internal error.
6 *	NLS internal error.
7	Reserved portion of *flags* is not zero.
8	Both upshift and downshift requested.
9	Invalid table element.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

charset *logical array (optional)*
An array containing the character set definition for the language to be used, as returned in NLINFO item 12. If present, the *langnum* parameter will be ignored, and this routine will be much more efficient. This parameter is required for split-stack calls in which *flags* (12:4) is not equal to 0 and *flags* (12:4) is not equal to 15.

shift *logical array (optional)*
An array containing shift information for a desired upshift or downshift (e.g., as returned in NLINFO items 15 or 16). This parameter will be utilized when bits (9:2) of *flags* is not equal to 0. If present, the *langnum* parameter will be ignored, and this routine will be much more efficient. In split-stack calls this parameter is required if bits (9:2) of *flags* is not equal to 0.

SPECIAL CONSIDERATIONS

Split-stack calls are permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Programs F and G, in Appendix H, "EXAMPLE PROGRAMS."

NLTRANSLATE

INTRINSIC NUMBER 404

The NLTRANSLATE intrinsic translates a string of characters from EBCDIC-to-ASCII or ASCII-to-EBCDIC using the appropriate native language table. This intrinsic performs the same function as CTRANSLATE using native language tables.

SYNTAX

```
                IV      BA          BA          IV          IV      LA    LA    O-V
NLTRANSLATE (code,instring,outstring,stringlength,langnum,error,table);
```

The *instring* parameter is translated into *outstring* for length of *stringlength* using a translation table determined according to the first rule that applies from the following list:

1. If *table* is present, a translation will be made using *table*.
2. If *langnum* equals NATIVE-3000 a standard ASCII-to-EBCDIC or EBCDIC-to-ASCII translation is made.
3. The ASCII-to-EBCDIC or EBCDIC-to-ASCII translation table for the language specified will be used.

PARAMETERS

code *integer by value (required)*

1 EBCDIC-to-ASCII
2 ASCII-to-EBCDIC

instring *byte array (required)*
The string of characters to be translated.

outstring *byte array (required)*
A byte array to which the translated string is returned. The parameters *instring* and *outstring* may specify the same array.

stringlength *integer by value (required)*
A positive integer specifying the number of bytes of *instring* to be translated.

langnum *integer by value (required)*
An integer containing the language ID number of the language whose translation tables are to be used.

error — *logical array (required)*

The first word of this two-word array contains the error number. The second word is reserved and always contains zero. If the call is successful, both words contain zero.

Error #	Meaning
1 *	NLS is not installed.
2 *	Specified language is not configured.
3	Invalid *code* specified.
4	Invalid *length* parameter.
5 *	NLS internal error.
6 *	NLS internal error.

* These errors do not apply to calls with a *langnum* equal to 0 (NATIVE-3000).

table — *logical array (optional)*

A 256-byte array which holds a translation table. Each byte contains the translation of the byte whose value is its index. This parameter corresponds to NLINFO items 13 and 14. If present, *langnum* parameter will be ignored and this routine will be much more efficient.

SPECIAL CONSIDERATIONS

Split-stack calls are not permitted.

ADDITIONAL DISCUSSION

For example calls of this intrinsic refer to Program H in Appendix H, "EXAMPLE PROGRAMS."

SYSTEM UTILITIES

APPENDIX
A

NLUTIL Program

The program allows the user to verify the language/character set configuration on the system.

```
:RUN NLUTIL.PUB.SYS
```

This displays a table of the configured languages and their character set. For example:

Lang ID	Lang Name	Char ID	Char Name
3	DANISH	1	ROMAN8
5	ENGLISH	1	ROMAN8
12	SPANISH	1	ROMAN8

A prompt asks whether the user wants a full listing:

```
Do you require a full listing of the current configuration? (Y/N)
```

An "N" response will terminate the program. A "Y" response will produce a complete formatted listing of the currently configured languages written to file NLLIST on device class LP.

NLS File Structure

The file NLSDEF.PUB.SYS lists all character sets supported by Hewlett-Packard and it relates character set names to character set ID numbers. It does the same for languages, and it indicates, for every language, what character set is required to support that language.

A file CHRDEF*xx* (*xx* is the character set ID number) contains the data pertaining to the character set with ID number *xx*, and all languages supported by that character set. There is more than one CHRDEF*xx* file.

The NLSDEF and the CHRDEF*xx* files are used by the program LANGINST.PUB.SYS to build or modify the file LANGDEF.PUB.SYS (see below for a description of this program). This file is used at system start up to build a number of system data segments holding the information required by NLS. The number of data segments built at start up is one plus one for every language configured.

Language Installation Utility (LANGINST)

The file LANGDEF.PUB.SYS contains all language-dependent information for every language to be configured on a system at the next startup. It is an MPE file that is built or modified by running the program LANGINST. It gathers data from NLSDEF.PUB.SYS and CHRDEF*xx*.PUB.SYS files into LANGDEF.PUB.SYS.

Only a user logged into the PUB group of the SYS account as MANAGER.SYS can run LANGINST to:

- Add a language to the configuration file.
- Remove a language from the configuration file.
- Display and modify local formats of a configured language.
- Display the languages supported by Hewlett-Packard.
- Display the languages currently configured.
- Modify the system default language.

Any changes to LANGDEF will become effective when the system next comes up.

Adding a Language

LANGINST prompts the user MANAGER.SYS for the language to add to LANGDEF. The user may supply either the language ID number or name. If RETURN is entered, the operation is aborted. If the language is already installed the user is advised, and the addition is cancelled with an error message:

```
SWEDISH is already configured.
```

Similarly, for example, if the appropriate CHRDEF*xx* file is not available, the add is cancelled with an error message:

```
The CHRDEFxx file is missing.
The Addition has been cancelled.
```

Refer to Table A-1 for a complete list of LANGINST error messages.

It is not possible to add NATIVE-3000. This language is hard-coded and is always configured. Any attempt to configure it will result in the error message:

```
NATIVE-3000 is always configured.
```

Deleting a Language

LANGINST allows the user to delete any configured language with the exception of NATIVE-3000, which cannot be deleted. In addition, a check is made to ensure that the language designated as the system default is not deleted.

Modifying Local Formats

The System Manager is allowed to modify the following local formats for any language configured in LANGDEF:

- Date format (Dateline format).
- Custom date format (Short).
- Time format.
- Currency sign.
- Decimal and thousands indicator.
- Month names.
- Abbreviated month names.
- Weekday names.
- Abbreviated weekday names.
- Yes/No indicators.
- National date table.

If the language supports a special National Table containing date information (KATAKANA), the last option is displayed to allow the user to modify this date information.

Whenever any changes have been made, the new copy of the file is saved under the name LANGDEF. In addition, the old, unchanged version of the file is saved under the name LANGD*xxx*. The number *xxx* increases by one every time a new copy of LANGDEF is saved. This allows the user to return to the configuration that existed before LANGDEF was changed. To return to the previous configuration, :PURGE or :RENAME the current LANGDEF. Then :RENAME the LANGD*xxx* with the highest number LANGDEF. The next system startup will delete the changes.

LANGINST User Dialogue

The following are user dialogues for choosing a function, adding a language, deleting a language, and modifying local language formats.

CHOOSING A FUNCTION. The System Manager selects an item from the main menu:

```
0.  EXIT
1.  ADD LANGUAGE TO LANGDEF
2.  DELETE LANGUAGE FROM LANGDEF
3.  MODIFY NATIVE FORMATS
4.  LIST HP SUPPORTED LANGUAGES
5.  MODIFY THE SYSTEM DEFAULT LANGUAGE
6.  LIST LANGUAGES CURRENTLY CONFIGURED
```

To list languages which can be configured on the system, select Option 4:

```
HP SUPPORTED LANGUAGES:

 0 NATIVE-3000              using        USASCII
 1 AMERICAN                 using        ROMAN8
 2 CANADIAN-FRENCH          using        ROMAN8
 3 DANISH                   using        ROMAN8
 4 DUTCH                    using        ROMAN8
 5 ENGLISH                  using        ROMAN8
 6 FINNISH                  using        ROMAN8
 7 FRENCH                   using        ROMAN8
 8 GERMAN                   using        ROMAN8
 9 ITALIAN                  using        ROMAN8
10 NORWEGIAN                using        ROMAN8
11 PORTUGUESE               using        ROMAN8
12 SPANISH                  using        ROMAN8
13 SWEDISH                  using        ROMAN8
41 KATAKANA                 using        KANA8

press any key to continue ...
```

ADDING A LANGUAGE. To add a language, select Option 1:

1. Use the language name or language ID number (*langnum*).

2. The addition is aborted by entering a RETURN, a language that is already configured, a language not supported by NLS, or NATIVE-3000.

   ```
   Enter language to be added: SPANISH

   SPANISH is already configured.
   ```

   If a language is requested that is supported but has not been previously configured, LANGINST configures it and displays the message:

   ```
   SPANISH has been successfully configured.
   ```

3. When the addition is successfully completed, or else aborted, the main menu is displayed.

DELETING A LANGUAGE. To delete a language, select Option 2:

1. Use the language name or language ID number (*langnum*).

2. The deletion is aborted by entering a RETURN, a language that is not configured, or the system default language.

3. When the deletion is successfully completed, or else aborted, the main menu is displayed.

MODIFYING LOCAL LANGUAGE FORMATS. To modify local language formats, select Option 3:

1. Use the language name or language ID number (*langnum*).

2. The process is aborted by entering a (RETURN), a language that is not configured, or NATIVE-3000.

3. If the process is aborted, the main menu is displayed.

4. If a configured language is entered, a menu is displayed:

```
0.  RETURN
1.  DATE FORMAT (Dateline format)
2.  CUSTOM DATE FORMAT (Short)
3.  TIME FORMAT
4.  CURRENCY SIGN
5.  DECIMAL AND THOUSANDS INDICATOR
6.  MONTH NAMES
7.  ABBREVIATED MONTH NAMES
8.  WEEKDAY NAMES
9.  ABBREVIATED WEEKDAY NAMES
10. YES/NO INDICATORS
11. PROCESS THE NATIONAL DATE TABLE

Enter selection number          :4
Business Currency sign          :F
Enter the new value             :<CR>
Fully qualified Currency sign :FF
Enter the new value             :<CR>
The currency sign currently follows the number, e.g., 100DM.

The following currency codes are available:

<CR> to retain the existing value.
0 - The currency symbol precedes the number, e.g., $100.00.
1 - The currency symbol succeeds the number, e.g., 100.00DM.
2 - The currency symbol replaces the decimal point, e.g., 100$00.

Enter the required currency codes (0, 1, or 2) :<CR>
There are to be no blanks before or after the currency symbol.

The following blank-control codes are available:

<CR> to retain the existing value.
0 - No blanks before or after the currency symbol.
1 - A blank is to precede the currency symbol.
2 - A blank is to succeed the currency symbol.
3 - A blank is to precede and succeed the currency symbol.

Enter the required code (0, 1, 2, or 3):<CR>
```

After the selection is made, the current value is displayed. The user is prompted for a new value. If a new value is entered, it is validated and if valid it replaces the old value. If no new value is entered (only (RETURN)) or if an invalid value is entered, the old value is retained.

Error Messages

Table A-1 contains LANGINST error messages.

Table A-1. LANGINST Error Messages

MESSAGE	MEANING	ACTION
A NONNUMERIC GRAPHIC CHARACTER IS EXPECTED...	An alphabetic or special character (but not numeric) is expected.	Enter a valid character.
ATTEMPTING TO ADD TOO MANY CHARACTER SETS.	Adding this language would exceed the maximum configurable character sets.	Don't configure languages from so many character sets.
BUILDING AN EMPTY LANGDEF ...	There was no existing LANGDEF file, so a new, empty one is being built.	None. If you have already configured languages, find LANGDEF.PUB.SYS on a backup and restore it. Or else, reconfigure the languages with this program.
DELETION TERMINATED ... ATTEMPTING TO DELETE NATIVE-3000.	The language NATIVE-3000 may not be deleted from the list of configured languages.	None.
ERRONEOUS STARTING YEAR NUMBER. EXPECTED A NUMBER BETWEEN 0 AND 99.	The year number entered in not valid.	Enter the year number again. It must be a number between 0 and 99.
INPUT TOO LONG ... PLEASE REENTER:	The program does not expect so much input in this context.	Reenter the data correctly.
INTERNAL ERROR ... PLEASE REPORT.	Internal error.	Contact your Hewlett-Packard representative.
INVALID DATE FORMAT. EXPECTED MM/DD/YY.	The entered date is not valid.	Enter the date again in the form MM/DD/YY.
LANGNAME IS ALREADY CONFIGURED.	The language selected has already been configured.	None.
LANGNAME IS AN ILLEGAL LANGUAGE NAME (OR NUMBER).	The language name or number entered is not valid.	Enter the language again, correctly.

Table A-1. LANGINST Error Messages (Continued)

MESSAGE	MEANING	ACTION
LANGNAME IS AN INVALID SYSTEM DEFAULT LANGUAGE.	The language selected is not configured on the system.	Add the language to the list of currently configured languages with this program.
LANGNAME IS NOT A CONFIGURED LANGUAGE.	The language selected is not configured on your system.	Add the language to the list of currently configured languages with this program.
LANGNAME IS NOT CONFIGURED.	The language entered is not configured on your system.	Add the language to the list of currently configured languages with this program.
LANGNAME IS NOT IN THE CHRDEF FILE.	One of the CHRDEF*xx* files is not consistent with the NLSDEF file.	Restore all CHRDEF*xx* files and NLSDEF from your master backup.
NATIVE-3000 IS ALWAYS CONFIGURED.	NATIVE-3000 may not be added to the list of configured languages because it is always configured.	None.
NATIVE-3000 MAY NOT BE MODIFIED.	The language definition of NATIVE-3000 may not be modified.	None.
THE CHRDEF*XX* FILE IS MISSING. THE ADDITION HAS BEEN CANCELLED.	The character definition file for the selected language is missing.	Restore the missing file from your master backup.
THE DECIMAL SEPARATOR AND THOUSANDS SEPARATOR SHOULD BE DIFFERENT.	The decimals and thousands separators have been defined to be the same.	Change the decimal and/or thousands indicator.
THE EXPECTED NAME SHOULD CONTAIN ALPHABETIC CHARACTERS ONLY.	Only alphabetic characters are allowed in this context.	Please re-enter the value, restricting the input to alphabetic characters.
THE FILECODE FOR CHRDEFXX.PUB.SYS IS INCORRECT.	The character definition file for the selected language has a bad file code.	Restore the missing CHRDEF*xx* file from the master backup.

Table A-1. LANGINST Error Messages (Continued)

MESSAGE	MEANING	ACTION
THE FILECODE FOR LANGDEF.PUB.SYS IS INCORRECT.	The current language definition file has a bad file code.	Restore LANGDEF.PUB.SYS from a backup copy. Or purge it, and recreate it by reconfiguring the desired languages with this program.
THE FILECODE FOR NLSDEF.PUB.SYS IS INCORRECT.	The master NLS definition file has a bad file code.	Restore NLSDEF.PUB.SYS from the master backup.
THE LANGUAGE YOU ARE ATTEMPTING TO DELETE IS THE SYSTEM DEFAULT LANGUAGE.	The system default language may not be deleted from the list of configured languages.	If you wish to delete this language, you must first change the system default language to another language.
THE USER SHOULD BE MANAGER.SYS, RUNNING IN THE PUB GROUP.	The user is not MANAGER.SYS or is not logged on in the PUB group.	Log on as MANAGER.SYS in the PUB group and run the program again.
THERE IS NO MORE ROOM FOR ADDITIONAL DATE PERIODS. PLEASE REPORT.	There is no room for additional entries in the national date table.	Contact your Hewlett-Packard representative.
TOO MANY LANGUAGES HAVE BEEN CONFIGURED.	Adding another language would exceed the maximum configurable languages.	Don't configure so many languages on one system.
UNABLE TO RENAME LANGDEF TO LANGD*nnn*. THE EXISTING LANGDEF WILL BE PURGED.	The old LANGDEF file could not be renamed because all files LANGD000 thru LANGD999 already existed.	Purge some or all of the files LANGD000 to LANGD999 so the most recent changes to LANGDEF can be saved in the future.
UNKNOWN OPTION .... PLEASE REENTER.	The option selected is not a valid one.	Enter the number corresponding to one of the currently valid options.

SUPPORTED LANGUAGES AND CHARACTER SETS

APPENDIX B

Character Set Definitions

The character sets supported by NLS are:

Set Name	Set ID Number	Languages Supported
USASCII	00	NATIVE-3000.
ROMAN8	01	Many European-based languages.
KANA8	02	Phonetic Japanese (katakana).

All character sets are supersets of USASCII, and are occasionally referred to generically as "ASCII" character sets, as in the term "ASCII-to-EBCDIC translation".

For every character set a character attribute table is defined. This table of 256 entries holds an attribute (type) for every character.

Type Identification:	Example
0: Numeric character.	2, 7, 9
1: Alphabetic lowercase character.	å, b, ñ, q, x
2: Alphabetic uppercase character.	A, B, Ñ, Q, X
3: Undefined graphic character.	
4: Special character.	#, %, ?, £
5: Control code.	Linefeed, Escape

Language Definitions

The following language names and language ID numbers are supported in NLS:

USASCII (Set #0)

Language Number	Language Name
00	NATIVE-3000

ROMAN8 (Set #1)

Language Number	Language Name
00	NATIVE-3000
01	AMERICAN
02	CANADIAN-FRENCH
03	DANISH
04	DUTCH
05	ENGLISH
06	FINNISH
07	FRENCH
08	GERMAN
09	ITALIAN
10	NORWEGIAN
11	PORTUGUESE
12	SPANISH
13	SWEDISH

KANA8 (Set #2)

00	NATIVE-3000
41	KATAKANA

The following items are defined for every supported language:

The upshift and downshift table.
The collating sequence table.
The ASCII-to-EBCDIC and EBCDIC-to-ASCII translate tables.
The long date format (the DATELINE format).
The short date format (the custom date format).
The time format.
The currency symbol (one character).
The currency descriptor (up to four characters).
The position and spacing of the currency sign.
The decimal and thousands separators for numbers.
The equivalents of YES and NO (both up to six characters).
The full weekday names (up to twelve characters).
The abbreviated weekday names (up to three characters).
The full month names (up to twelve characters).
The abbreviated month names (up to four characters).
The National Date table (where applicable).

Refer to the discussion on the NLINFO intrinsic in Section IV for a complete description of these items.

ROMAN8 CHARACTER SET
(USASCII PLUS ROMAN EXTENSION)

b_4	b_3	b_2	b_1		b_8	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
					b_7	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
					b_6	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
					b_5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
						0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0		NUL	DLE	SP	0	@	P	‘	p				—	â	Å	Á	Þ
0	0	0	1	1		SOH	DC1	!	1	A	Q	a	q			À		ê	Î	Ã	þ
0	0	1	0	2		STX	DC2	"	2	B	R	b	r			Â		ô	Ø	ã	
0	0	1	1	3		ETX	DC3	#	3	C	S	c	s			È	°	û	Æ	Đ	
0	1	0	0	4		EOT	DC4	$	4	D	T	d	t			Ê	Ç	á	å	đ	
0	1	0	1	5		ENQ	NAK	%	5	E	U	e	u			Ë	ç	é	í	Í	
0	1	1	0	6		ACK	SYN	&	6	F	V	f	v			Î	Ñ	ó	ø	Ì	—
0	1	1	1	7		BEL	ETB	’	7	G	W	g	w			Ï	ñ	ú	æ	Ó	¼
1	0	0	0	8		BS	CAN	(	8	H	X	h	x			´	¡	à	Ä	Ò	½
1	0	0	1	9		HT	EM	)	9	I	Y	i	y			`	¿	è	ì	Õ	ª
1	0	1	0	10		LF	SUB	*	:	J	Z	j	z			^	¤	ò	Ö	õ	º
1	0	1	1	11		VT	ESC	+	;	K	[	k	{			¨	£	ù	Ü	Š	«
1	1	0	0	12		FF	FS	,	<	L	\	l	|			~	¥	ä	É	š	■
1	1	0	1	13		CR	GS	-	=	M	]	m	}			Ù	§	ë	ï	Ú	»
1	1	1	0	14		SO	RS	.	>	N	^	n	~			Û	ƒ	ö	ß	Ÿ	±
1	1	1	1	15		SI	US	/	?	O	_	o	DEL			£	¢	ü	Ô	ÿ	

Figure B-1. ROMAN8 Character Set

KANA8 CHARACTER SET
(JISCII PLUS KATAKANA)

b_8	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
b_7	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
b_6	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
b_5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

b_4	b_3	b_2	b_1		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	NUL	DLE	SP	0	@	P	‘	p				—	タ	ミ		
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q			。	ア	チ	ム		
0	0	1	0	2	STX	DC2	"	2	B	R	b	r			「	イ	ツ	メ		
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s			」	ウ	テ	モ		
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t			、	エ	ト	ヤ		
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u			・	オ	ナ	ユ		
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
0	1	1	1	7	BEL	ETB	’	7	G	W	g	w			ァ	キ	ヌ	ラ		
1	0	0	0	8	BS	CAN	(	8	H	X	h	x			ィ	ク	ネ	リ		
1	0	0	1	9	HT	EM	)	9	I	Y	i	y			ゥ	ケ	ノ	ル		
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z			ェ	コ	ハ	レ		
1	0	1	1	11	VT	ESC	+	;	K	[	k	{			ォ	サ	ヒ	ロ		
1	1	0	0	12	FF	FS	,	<	L	¥	l	|			ャ	シ	フ	ワ		
1	1	0	1	13	CR	GS	-	=	M	]	m	}			ュ	ス	ヘ	ン		
1	1	1	0	14	SO	RS	.	>	N	^	n	~			ョ	セ	ホ	゛		
1	1	1	1	15	SI	US	/	?	O	_	o	DEL			ッ	ソ	マ	゜		

Figure B-2. KANA8 Character Set

COLLATING IN EUROPEAN LANGUAGES

APPENDIX C

Collating is defined as arranging character strings into some (usually alphabetic) order. To do this a mechanism must be available that, given two character strings, decides which one comes first. In Native Language Support (NLS) this mechanism is the NLCOLLATE intrinsic.

Look at the full ROMAN8 character set and consider that all these characters can appear in every European language. Even if a character does not exist in a language, it can still show up in names and/or addresses. It is quite useful to address a letter to Spain correctly, even if it originates in Germany. Therefore, the full ROMAN8 character set is considered to be used in all languages, and a collating sequence has been defined for all characters in the ROMAN8 character set for the languages it supports. Figure C-1 lists the collating sequence for:

AMERICAN
CANADIAN-FRENCH
DANISH
DUTCH
ENGLISH
FINNISH
FRENCH
GERMAN
ITALIAN
NORWEGIAN
PORTUGUESE
SPANISH
SWEDISH

All characters in a group, indicated by brackets (or, in a few footnotes, by underlining) collate the same. These characters usually differ only in uppercase versus lowercase priority, or accent priority. In sorting, they are initially considered the same. If the remaining characters in the two strings do not determine which string comes first, then the priorities of characters will be used to determine the order. Refer to Table C-1 for examples of collating sequence priority.

Table C-1. Examples of Collating Sequence Priority

Sorted Strings	Explanation
aéb, aéc	The third character in each string is different. The "b" precedes the "c".
aeb, aéb	The characters in the two strings are identical, so accent priority determines the order. The "e" precedes the "é".
abc, Abd	The last characters in the strings are different. The "c" precedes the "d".
aBc, abc	The characters in the two strings are the same, so the uppercase priority determines the order. "B" precedes "b".

NOTE

This Appendix deals with collating or lexical ordering, and does not include matching. For matching purposes, there is generally a difference between "A" and "a".

Figures C-1 and C-2 display the collating sequence in three ways: the graphic representation of the character, the decimal equivalent of the character's binary value, and a description of the character. Language-dependent variations to the collating sequence appear in Figure C-2.

Collating Sequence

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
	32	Space
	160	Do Not Use
0	48	Zero
1	49	One
2	50	Two
3	51	Three
4	52	Four
5	53	Five
6	54	Six
7	55	Seven
8	56	Eight
9	57	Nine
A	65	Uppercase A
a	97	Lowercase a
Á	224	Uppercase A Acute
á	196	Lowercase a Acute
À	161	Uppercase A Grave
à	200	Lowercase a Grave
Â	162	Uppercase A Circumflex
â	192	Lowercase a Circumflex
Ä	216	Uppercase A Umlaut/Diaeresis
ä	204	Lowercase a Umlaut/Diaeresis
Å	208	Uppercase A Degree
å	212	Lowercase a Degree
Ã	225	Uppercase A Tilde
ã	226	Lowercase a Tilde
B	66	Uppercase B
b	98	Lowercase b

Note that Æ ligature (211) and æ (215) are expanded for collating purposes to AE or ae and collate as: ad AE Ae Æ aE ae æ AF.

Figure C-1. Collating Sequence (1 of 7)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
C	67	Uppercase C
c	99	Lowercase c
Ç	180	Uppercase C Cedilla
ç	181	Lowercase c Cedilla
D	68	Uppercase D
d	100	Lowercase d
Đ	227	Uppercase D Stroke
đ	228	Lowercase d Stroke
E	69	Uppercase E
e	101	Lowercase e
É	220	Uppercase E Acute
é	197	Lowercase e Acute
È	163	Uppercase E Grave
è	201	Lowercase e Grave
Ê	164	Uppercase E Circumflex
ê	193	Lowercase e Circumflex
Ë	165	Uppercase E Umlaut/Diaeresis
ë	205	Lowercase e Umlaut/Diaeresis
F	70	Uppercase F
f	102	Lowercase f
G	71	Uppercase G
g	103	Lowercase g
H	72	Uppercase H
h	104	Lowercase h
I	73	Uppercase I
i	105	Lowercase i
Í	229	Uppercase I Acute
í	213	Lowercase i Acute
Ì	230	Uppercase I Grave
ì	217	Lowercase i Grave
Î	166	Uppercase I Circumflex
î	209	Lowercase i Circumflex
Ï	167	Uppercase I Umlaut/Diaeresis
ï	221	Lowercase i Umlaut/Diaeresis
J	74	Uppercase J
j	106	Lowercase j
K	75	Uppercase K
k	107	Lowercase k

Figure C-1. Collating Sequence (2 of 7)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
L	76	Uppercase L
l	108	Lowercase l
M	77	Uppercase M
m	109	Lowercase m
N	78	Uppercase N
n	110	Lowercase n
Ñ	182	Uppercase N Tilde
ñ	183	Lowercase n Tilde
O	79	Uppercase O
o	111	Lowercase o
Ó	231	Uppercase O Acute
ó	198	Lowercase o Acute
Ò	232	Uppercase O Grave
ò	202	Lowercase o Grave
Ô	223	Uppercase O Circumflex
ô	194	Lowercase o Circumflex
Ö	218	Uppercase O Umlaut/Diaeresis
ö	206	Lowercase o Umlaut/Diaeresis
Õ	233	Uppercase O Tilde
õ	234	Lowercase o Tilde
Ø	210	Uppercase O Crossbar
ø	214	Lowercase o Crossbar
P	80	Uppercase P
p	112	Lowercase p
Q	81	Uppercase Q
q	113	Lowercase q
R	82	Uppercase R
r	114	Lowercase r
S	83	Uppercase S
s	115	Lowercase s
Š	235	Uppercase S Caron
š	236	Lowercase s Caron
T	84	Uppercase T
t	116	Lowercase t

Note that the ß (222, sharp s) is expanded to ss and collates according to the German standard as: sr ß ss st.

Figure C-1. Collating Sequence (3 of 7)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
U	85	Uppercase U
u	117	Lowercase u
Ú	237	Uppercase U Acute
ú	199	Lowercase u Acute
Ù	173	Uppercase U Grave
ù	203	Lowercase u Grave
Û	174	Uppercase U Circumflex
û	195	Lowercase u Circumflex
Ü	219	Uppercase U Umlaut/Diaeresis
ü	207	Lowercase u Umlaut/Diaeresis
V	86	Uppercase V
v	118	Lowercase v
W	87	Uppercase W
w	119	Lowercase w
X	88	Uppercase X
x	120	Lowercase x
Y	89	Uppercase Y
y	121	Lowercase y
Ÿ	238	Uppercase Y Umlaut/Diaeresis
ÿ	239	Lowercase y Umlaut/Diaeresis
Z	90	Uppercase Z
z	122	Lowercase z
Þ	240	Uppercase Thorn
þ	241	Lowercase Thorn
	177	Currently Undefined
	178	Currently Undefined
	242	Currently Undefined
	243	Currently Undefined
	244	Currently Undefined
	245	Currently Undefined

Figure C-1. Collating Sequence (4 of 7)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
(	40	Left Parenthesis
)	41	Right Parenthesis
[	91	Left Bracket
]	93	Right Bracket
{	123	Left Brace
}	125	Right Brace
«	251	Left Guillemets
»	253	Right Guillemets
<	60	Less Than Sign
>	62	Greater Than Sign
=	61	Equal Sign
+	43	Plus
-	45	Minus
±	254	Plus/Minus
¼	247	One Quarter
½	248	One Half
°	179	Degree (Ring)
%	37	Percent Sign
*	42	Asterisk
.	46	Period (Point)
,	44	Comma
;	59	Semicolon
:	58	Colon

Figure C-1. Collating Sequence (5 of 7)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
¿	185	Inverse Question Mark
?	63	Question Mark
¡	184	Inverse Exclamation Point
!	33	Exclamation Point
/	47	Slant
\	92	Reverse Slant
|	124	Vertical Bar
@	64	Commercial At
&	38	Ampersand
#	35	Number Sign (Hash)
§	189	Section
$	36	U. S. Dollar Sign
¢	191	U. S. Cent Sign
£	187	British Pound Sign
£	175	Italian Lira Sign
¥	188	Japanese Yen Sign
ƒ	190	Dutch Guilder Sign
¤	186	General Currency Sign
"	34	Double Quote
'	96	Opening Single Quote
'	39	Closing Single Quote
^	94	Caret
~	126	Tilde

Figure C-1. Collating Sequence (6 of 7)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
´	168	Accent Acute
`	169	Accent Grave
^	170	Accent Circumflex
¨	171	Umlaut/Diaeresis
~	172	Tilde Accent
_	95	Underscore
—	246	Long Dash
¯	176	Overline
ª	249	Feminine Ordinal Indicator
º	250	Masculine Ordinal Indicator
■	252	Solid
	0 . . . 31	Control Codes
	128 . . . 159	Currently Undefined Control Codes
	127	DEL
	255	Do Not Use

Figure C-1. Collating Sequence (7 of 7)

Language-Dependent Variations

Listed below are language-dependent variations for Spanish, Danish/Norwegian, Swedish and Finnish.

SPANISH. CH is considered a separate character, which collates between C and D. The same applies to LL, which collates after L and before M:

C@	l@
CH	LL
Ch	Ll
cH	lL
ch	ll
D@	M@

The @ symbol can equal anything. Therefore, CH comes after C followed by anything, and before D followed by anything.

In Spanish N and Ñ are not considered the same in collating (this also applies to n and ñ). They are different characters which follow one another in the collating sequence:

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
N	78	Uppercase N
n	110	Lowercase n
Ñ	182	Uppercase N Tilde
ñ	183	Lowercase n Tilde

DANISH/NORWEGIAN. The Æ, Ø, and Å collate at the end of the alphabet:

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
Z	90	Uppercase Z
z	122	Lowercase z
Æ	211	Uppercase AE Ligature
æ	215	Lowercase ae Ligature
Ø	210	Uppercase O Crossbar
ø	214	Lowercase o Crossbar
Å	208	Uppercase A Degree
å	212	Lowercase a Degree
Þ	240	Uppercase Thorn
þ	241	Lowercase Thorn

Figure C-2. Language-Dependent Variations (1 of 3)

SWEDISH. The A, Ä and Ö are collated at the end of alphabet:

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
Z	90	Uppercase Z
z	122	Lowercase z
A	208	Uppercase A Degree
å	212	Lowercase a Degree
Ä	216	Uppercase A Umlaut/Diaeresis
ä	204	Lowercase a Umlaut/Diaeresis
Ö	218	Uppercase O Umlaut/Diaeresis
ö	206	Lowercase o Umlaut/Diaeresis
Þ	240	Uppercase Thorn
þ	241	Lowercase Thorn

FINNISH. The A, Ä, and Ö are treated the same as in Swedish. The Ø is considered to be the same as Ö. V and W, and Y and Ü are regarded as the same in Finnish.

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
U	85	Uppercase U
u	117	Lowercase u
Ú	237	Uppercase U Acute
ú	199	Lowercase u Acute
Ù	173	Uppercase U Grave
ù	203	Lowercase u Grave
Û	174	Uppercase U Circumflex
û	195	Lowercase u Circumflex
V	86	Uppercase V
v	118	Lowercase v
W	87	Uppercase W
w	119	Lowercase w
X	88	Uppercase X
x	120	Lowercase x
Y	89	Uppercase Y
y	121	Lowercase y
Ÿ	238	Uppercase Y Umlaut/Diaeresis
ÿ	239	Lowercase y Umlaut/Diaeresis
Ü	219	Uppercase U Umlaut/Diaeresis
ü	207	Lowercase u Umlaut/Diaeresis

Figure C-2. Language-Dependent Variations (2 of 3)

CHARACTER	DECIMAL EQUIVALENT	DESCRIPTION
Z	90	Uppercase Z
z	122	Lowercase z
Å	208	Uppercase A Degree
å	212	Lowercase a Degree
Ä	216	Uppercase A Umlaut/Diaeresis
ä	204	Lowercase a Umlaut/Diaeresis
Ö	218	Uppercase O Umlaut/Diaeresis
ö	206	Lowercase o Umlaut/Diaeresis
Ø	210	Uppercase O Crossbar
ø	214	Lowercase o Crossbar
Þ	240	Uppercase Thorn
þ	241	Lowercase Thorn

Figure C-2. Language-Dependent Variations (3 of 3)

EBCDIC MAPPINGS

APPENDIX D

NLS provides mappings, through NLTRANSLATE and NLINFO, from HP 3000 supported character sets (ROMAN8, KANA8) to the various national versions of the EBCDIC code. This applies to all native languages supported on the HP 3000, and is done differently for each language.

Background Data

EBCDIC is an 8-bit code which originally used only 128 of the 256 possible code values. These 128 characters have almost the same graphic representations as the traditional 7-bit, 128-character, USASCII code. Three characters are different. USASCII has the left and right square brackets ([ ]) and the caret (^), while EBCDIC includes the American cent (¢), the logical OR (¦), and the logical NOT (¬).

The EBCDIC code was modified to accommodate the extra characters required by European languages. For example, when the German EBCDIC was defined some less important characters were traded for German national characters, and the vertical bar (|) became lowercase ö. Similar things happened to create EBCDIC codes for Norwegian/Danish, Swedish/Finnish, Spanish, Belgian, Italian, Portuguese, French, and English in the UK.

The 128 unused positions in the various national language EBCDIC codes were later used to accommodate all national characters which appeared in any of the EBCDIC codes. Each resulting Country Extended Code Page became a superset of each existing national EBCDIC. In the German table, for instance, the empty space was used to accommodate characters from other languages, but the traditional German characters (ä, ö and ü, and ß) retained their original position in the German national EBCDIC. There are many Country Extended Code Pages now, all showing exactly the same characters, but showing them in different locations. Consider, for example, the character which has decimal code 161 (octal 241, hexadecimal A1). In original EBCDIC this is the ~. This is the sharp s (ß) in German, the diaeresis accent (¨) in French, the lowercase ü in Swedish/Finnish and Norwegian/Danish, the lowercase ì in Italian, and the lowercase ç in Portuguese.

This situation makes it necessary to map the Hewlett-Packard ROMAN8 character set to the many different EBCDIC Country Extended Code Pages.

ROMAN8 to EBCDIC Mapping

In mapping from ROMAN8 to and from any EBCDIC, characters look the same, or as close as possible, before and after conversion. The majority of the symbols appearing in ROMAN8 also exist in the EBCDIC Country Extended Code Pages. In ROMAN8 there are nine characters which have no similar EBCDIC character, and six undefined characters. Since there are no undefined characters in the EBCDIC Country Extended Code Pages, 15 characters in EBCDIC have no look-alike in ROMAN8. For these characters a one-to-one mapping has been defined as shown in Table D-1.

dec.	oct.	hex.		ROMAN8		EBCDIC
169	251	A9	`	Grave Accent	|	Logical OR
170	252	AA	^	Circumflex Accent	¬	Logical NOT
172	254	AC	~	Tilde Accent	²	Superscript 2
175	257	AF	£	Italian Lira Sign	³	Superscript 3
177	261	B1		Presently Undefined	µ	MU Character
178	262	B2		Presently Undefined	‗	Double Underline
235	353	EB	Š	Uppercase S Caron	Ý	Uppercase Y Acute
236	354	EC	š	Lowercase s Caron	ý	Lowercase y Acute
238	356	EE	Ÿ	Uppercase Y Umlaut	ı	Lowercase i Without Dot
242	362	F2		Presently Undefined	¸	Cedilla
243	363	F3		Presently Undefined	¶	Paragraph Sign
244	364	F4		Presently Undefined	®	"Registered" Sign
245	365	F5		Presently Undefined	¾	Three Quarters
246	366	F6	_	Long Dash	SHY	Syllable Hyphen
252	374	FC	■	Solid	•	Middle Dot

Figure D-1. ROMAN8 to EBCDIC Mapping

For the Hewlett-Packard KANA8 character set, which supports KATAKANA, the mapping to and from EBCDIC is defined by Japanese Industrial Standards (JIS) and IBM.

In all languages, the character mappings defined and implemented on the HP 3000 are such that any character mapped from any Hewlett-Packard 8-bit character set to EBCDIC and then back again, or vice versa, will result in the original character value. A complete listing of the Hewlett-Packard 8-bit character set to EBCDIC mappings and vice versa can be obtained by running the utility NLUTIL.PUB.SYS.

The mappings can be made available to a program by the NLINFO intrinsic item 13 or 14. The mappings are used by the NLTRANSLATE intrinsic, which performs the Hewlett-Packard 8-bit to EBCDIC translation or the reverse. The CTRANSLATE intrinsic maps USASCII to EBCDIC (and vice versa) and maps JISCII to EBCDIK (and vice versa). For the languages NATIVE-3000 and KATAKANA there is no difference between the mappings produced by NLTRANSLATE and CTRANSLATE.

PERIPHERAL CONFIGURATION

APPENDIX E

Native Language Support (NLS) relies on the use of 8-bit character sets to encode alphabetic, numeric and special characters required for the proper representation of native languages. Two character sets are available, ROMAN8 and KANA8. This Appendix explains how to configure various printers and terminals supported on the HP 3000 for 8-bit operation, so that ROMAN8 or KANA8 characters may be entered and displayed.

Most Hewlett-Packard terminals and printers are designed for 8-bit operation. Some have limitations which are listed as Notes at the end of this Appendix. A listing of relevant Notes is included with the instructions for each peripheral, and the peripherals to which such notes apply are listed in Table E-2.

NLS Terminology

The following are definitions of NLS terms:

JISCII	The Japanese version of USASCII. It is a 7-bit character set identical to USASCII with the exception that the Japanese yen symbol replaces the "\" character.
KANA8	The Hewlett-Packard supported 8-bit character set for the support of phonetic Japanese (katakana). It includes all of JISCII plus the katakana characters. Refer to Appendix B for the table of KANA8 characters.
ROMAN8	The Hewlett-Packard supported 8-bit character set for Europe. It includes all of USASCII plus those characters necessary to support the major western European languages. Refer to Appendix B for the table of ROMAN8 characters.
Roman Extension	Part of the "old ROMAN8" as implemented on a number of the older Hewlett-Packard terminals and printers. It is not a character set in itself but refers to an extension to USASCII. This extension is usually implemented as an alternate character set. The characters in Roman Extension form a subset of the non-USASCII characters in ROMAN8 and the same internal codes are used in both cases.
Old ROMAN8	USASCII plus Roman Extension. The manuals for terminals supporting old ROMAN8 contain this table.
Processing Standard	The internal Hewlett-Packard 8-bit processing standard for all Hewlett-Packard products. This standard was developed in anticipation of NLS and specifies standard character sets, escape sequences, character designations and invocations and keyboard operation for peripherals and systems.
Limited Support	Refer to the Notes for each specific peripheral.

NLS Peripheral Support Summary

Tables E-1, E-2, and E-3 contain information on which peripherals are fully supported, have limited support, and those which are not supported.

Table E-1. Peripherals Fully Supported in 8-Bit Operation - All Language Options

Model/Type	Conforms To Processing Standard	Supports Full ROMAN8	Supports Old ROMAN8
HP 150 PC/As Terminal	YES	YES	YES
HP 2392A Terminal	YES	NO	YES
HP 2563A Printer	YES	YES	YES
HP 2621B Terminal	YES	NO	YES
HP 2622J Terminal	YES	YES*	N/A*
HP 2623J Terminal	YES	YES*	N/A*
HP 2625A Terminal	YES	YES	YES
HP 2627A Terminal	YES	NO	YES
HP 2628A Terminal	YES	YES	YES
HP 2932A Printer	YES	YES	YES
HP 2933A Printer	YES	YES	YES
HP 2934A Printer	YES	YES	YES
HP 2700 Terminal	YES	NO	YES

* Supports KANA8 rather than ROMAN8.

Table E-2. Peripherals With Limited Support in 8-Bit Operation

Model/Type	Conforms To Processing Standard	Supports Full ROMAN8	Supports Old ROMAN8
HP 2382A Terminal	NO	NO	YES
HP 2608A Printer	NO	NO	YES
HP 2608S Printer	NO	NO	YES
HP 2622A Terminal	NO	NO	YES
HP 2623A Terminal	NO	NO	YES
HP 2626A Terminal	NO	NO	YES
HP 2626W Terminal	NO	NO	YES
HP 2631B Printer	NO	NO	YES
HP 2635B Prntr/Term	NO	NO	YES
HP 2645J Terminal	NO	YES*	N/A*
HP 2680A Printer	NO	NO	YES
HP 2688A Printer	NO	YES	YES

* Supports KANA8 rather than ROMAN8.

Table E-3. Peripherals Not Supported in 8-Bit Operation

Model/Type	Conforms To Processing Standard	Supports Full ROMAN8	Supports Old ROMAN8
HP 2624B Terminal	NO	NO	NO
HP 2687A Printer	YES	NO	NO**

** This printer functions correctly in 8-bit operation (it has no 7-bit operation). However, much of the ROMAN8 character set is not implemented and KANA8 is unavailable. Some of Roman Extension is not implemented; but 8-bit characters with some of the Roman Extension values print in a degraded fashion (i.e., accented vowels print as the corresponding vowel without accent, and the international currency symbol prints as "0").

Specifics of 7-Bit Support

No peripherals are supported in 7-bit native language operation.

All peripherals are supported in 7-bit USASCII operation, though the non-USASCII characters are then unavailable. This includes the devices not listed at all in the preceding tables, because they are devices which have only 7-bit operation.

If 8-bit data is sent to a device configured for 7-bit USASCII operation, those characters with the eighth bit on will be displayed as unrelated (but predictable) USASCII characters, or else as blanks, depending on the device. For example, an "à" displays as "H" on a 2645A terminal.

This Appendix contains specific information on each device supported in 8-bit mode to help configure these peripherals to utilize NLS capabilities.

NLS Peripheral Support Details

There are two ways to access ROMAN8 characters not on the keyboard.

From many of the terminal keyboard layouts (e.g., French and Spanish) you can access a few ROMAN8 characters (certain accented vowels) from the standard keyboard by using mutes. Enter a non-spacing diacritical character (such as an accent mark or circumflex), then the unaccented vowel. The result on the screen is a single, merged character, and usually a single, merged character is transmitted to the system. (See Notes 7 and 10 for some of the peripherals.)

Accessing ROMAN8 or KANA8 characters that do not appear on your keyboard can be accomplished by using "N^{C}"/"O^{C}", ". ^{C}"/", ^{C}", or the "Extend char" key, depending on the terminal. If your terminal uses "N^{C}" (or "shifting out"), please consult Notes 1-4 at the end of this Appendix.

HP 150 P.C. as a Terminal

Requirements

None. ROMAN8 character set is standard.

Character Set Supported

ROMAN8

Configuring For 8-Bit Operation

Global Configuration	Language = Language of the keyboard.
Port1 or Port2	Parity = None DataBits = 8 Check Parity = No
Terminal Configuration	ASCII 8-Bits = Yes
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing ROMAN8 Characters Not On The Keyboard

Access the ROMAN8 characters not on the national keyboard by pressing the "Extend char" key, holding it down while pressing one of the other keys. Most of the accented vowels, as well as the Spanish Ñ or ñ, are accessed from most of the national keyboards by means of mutes. The mute is a diacritical mark such as an accent, circumflex, or diaeresis. Enter a non-spacing diacritical character (if it is not on the keyboard layout, press the "Extend char" key), then the unaccented vowel (or N or n). The screen displays a single, merged character, and a single, merged character is transmitted to the system. The non-spacing diacritical character is not displayed on the screen until the second character is typed.

Notes

None.

HP 2382A Terminal

Requirements

Option 001, 002, 003, 004, 005, 006 or 007 (National keyboard and ROM).

Character Set Supported

USASCII plus Roman Extension

Configuring For 8-Bit Operation

Datacomm Configuration	Parity = None Chk Parity = No
Terminal Configuration	ASCII 8-Bits = Yes Language = Language of the keyboard layout.
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

To configure the terminal for 8-bit operation as the default, set switches A5=up, A6=down, A7=up, B1=down.

Typing USASCII/Roman Extension Characters Not On Keyboard

If the keyboard layout is French or Spanish and LANGUAGE=FRANCAIS azM, FRANCAIS qwM, or ESPANOL M, some Roman Extension characters (certain accented vowels) are accessible from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character. With a national keyboard, the USASCII characters, which are replaced on the keyboard, cannot be entered, but they can be displayed when received from the system.

Access the Roman Extension characters not on the keyboard by shifting out the keyboard. Enter "N^{C}" to do so. Enter "O^{C}" to return to the usual keyboard layout.

Notes

1,2,4,5,6,7,9.

HP 2392A Terminal

Requirements

None. A subset of the ROMAN8 character set is standard.

Character Set Supported

A subset of ROMAN8 (the last two columns of the ROMAN8 table are missing).

Configuring For 8-Bit Operation

Datacomm Configuration	Parity/DataBits = None/8.
Terminal Configuration	Keyboard = National layout of keyboard. Language = Language in which terminal messages and labels are to appear.
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing ROMAN8 Characters Not On Keyboard

Some ROMAN8 characters (certain accented vowels) are accessible from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character, and a single, merged character is transmitted to the system (in both character and block mode).

ROMAN8 characters not on the keyboard are accessible by pressing the "Extend char" key, holding it down while pressing another key. Most accented vowels are accessed via mute character combinations. The mute character itself is accessed via the "Extend char" key, and the vowel from the standard keyboard. The placement of extended characters is in Appendix B of the HP 2392A Display Station Reference Manual (02392-90001).

Notes

None.

HP 2563A Printer

Requirements

None. ROMAN8 character set is standard.
(KANA8 is available with Option #002.)

Character Set Supported

ROMAN8, KANA8

Configuring For 8-Bit Operation

Printer	Set primary character set = 20 (ROMAN8) or = 21 (KANA8) via the switches on the front panel. If the printer has a serial interface, set DataBits = 8, Parity = None. These configurations can also be done programmatically with escape sequences.
MPE I/O Configuration	For serial interface, configure the printer on the HP 3000 as Termtype = 20 (8-bits of data). On a Multipoint line, use Termtype = 18 or 22. For HP-IB interface, use Type = 32, Subtype = 9. This permits programmatic reconfiguration via escape sequences.

Notes

None.

HP 2608A/HP 2608S Printers

Requirements

Option 001 and 002 for KANA8.
Option 002 for Roman Extension.

Character Set Supported

KANA8
USASCII plus Roman Extension

Configuring For 8-Bit Operation

Set switches on front panel:

USASCII+RomExt
Primary Language = 0000
Secondary Language = 1111

KANA8
Primary Language = 1110
Secondary Language = 0011

On the HP 2608S only, a program can also set these values via escape sequences.

MPE I/O Configuration Termtype = 20 or 22.

Notes

9,11.

HP 2621B Terminal

Requirements

Option 001,002,003,004,005,006 and/or 010 (National keyboard and/or extended character set ROMs).

Option 101,102,103,104,105,106 and/or 110 (Extended national keyboard and/or ROMs).

Character Set Supported

USASCII plus Roman Extension

Configuring For 8-Bit Operation

Set switches P0,P1,P2:	Set to 0,1,0 (down,up,down).
Set switches L0,L1,L2:	Set to language of keyboard layout (see HP 2621B Manual (02620-90062), for settings for keyboard layout), and switch 5 of the left-hand group = 0 to activate the keyboard of that language.
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing USASCII/Roman Extension Characters Not On Keyboard

If the keyboard layout is French or Spanish a few Roman Extension characters (certain accented vowels) are accessible from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character, and a single, merged character is transmitted to the system.

Roman Extension characters (except those available via mutes) not available on the keyboard cannot be entered. But they can be displayed when received from the system.

The USASCII characters which are replaced on the native keyboard are available after pressing [f1] in the "modes" level (an asterisk will appear next to the "USASCII" label for this function key). This causes the keyboard to become the standard USASCII layout. Press [f1] again (the asterisk will disappear) to return to the native keyboard.

Notes

10.

HP 2622A/HP 2623A Terminals

Requirements

Option 001, 002, 003, 004, 005, 006 or 202 (National keyboard and/or extended character set ROMs).

Character Set Supported

USASCII plus Roman Extension

Configuring For 8-Bit Operation

Datacomm Configuration	Parity = None Chk Parity = No
Terminal Configuration	ASCII 8-Bits = Yes Language = Language of the keyboard layout.
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing USASCII/Roman Extension Characters Not On Keyboard

If the keyboard layout is French or Spanish and `LANGUAGE=FRANCAIS azM`, `FRANCAIS qwM`, or `ESPANOL M`, a few Roman Extension characters (certain accented vowels) can be accessed from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character. Access the USASCII characters replaced on a national keyboard by pressing SHIFT and one of the numeric pad keys.

Access the Roman Extension characters not on the keyboard by shifting out the keyboard. Enter "N^C" to do so. Enter "O^C" to return to the usual keyboard layout.

Notes

1,2,4,5,6,7,9.

HP 2622J/HP 2623J Terminals

Requirements

None. Katakana is standard.

Character Set Supported

KANA8.

Configuring For 8-Bit Operation

Datacomm Configuration	Parity = None Chk Parity = No
Terminal Configuration	ASCII 8-Bits = Yes
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing KANA8 Characters Not On The Keyboard

Access the KANA8 characters not in JISCII by pressing the "katakana" key to enter katakana mode. Press the "CAPS" key to return to the JISCII keyboard.

Notes

None.

HP 2625A/HP 2628A Terminals

Requirements

None. ROMAN8 character set is standard.

Character Set Supported

ROMAN8

Configuring For 8-Bit Operation

Datacomm Configuration	Parity = None Chk Parity = No DataBits = 8 (in Multipoint: Code = ASCII8).
Terminal Configuration	ASCII 8-Bits = Yes
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing ROMAN8 Characters Not On The Keyboard

If the keyboard layout is French or Spanish a few ROMAN8 characters (certain accented vowels) can be accessed from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character, and a single, merged character is transmitted to the system (in both character and block mode).

Access the ROMAN8 characters not on the keyboard by pressing ".^{C}" to enter "extended characters mode." When not using the USASCII keyboard, this may not actually be the key labelled period (.) but the period key for the USASCII keyboard. A keyboard layout showing the placement of extended characters is located in the User's Manual for the HP 2625A Dual-System Display Terminal and HP 2628A Word-Processing Terminal (02625-90001). Enter ",^{C}" to return to the usual keyboard layout.

Notes

None.

HP 2626A/HP 2626W Terminals

Requirements

Option 001, 002, 003, 004, 005, 006 or 201 (National keyboard and/or extended character set ROMs).

Character Set Supported

USASCII plus Roman Extension

Configuring For 8-Bit Operation

Global Configuration	Language = Language of keyboard layout.
Datacomm Configuration	Parity = None Chk Parity = No DataBits = 8 (In Multipoint: Code = ASCII8).
Terminal Configuration	ASCII 8-Bits = Yes ESC) A = RomanExt* Alternate Set = A.
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

*On some versions of the 2626W the RomanExt and BOLD alternate sets are exchanged. Press IDENTIFY ROMS; if CHARACTER ROMS show 1818-1916 and 1818-1917, Rev.A, set ESC) A = BOLD to access ROMAN8.

Typing USASCII/Roman Extension Characters Not On Keyboard

If the keyboard layout is French or Spanish and LANGUAGE=FRANCAIS azM, FRANCAIS qwM, or ESPANOL M, a few Roman Extension characters (certain accented vowels) can be accessed from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character. Access the USASCII characters replaced on a national keyboard by pressing SHIFT and one of the numeric pad keys.

Access the Roman Extension characters not on the keyboard by shifting out the keyboard. Enter "N^{C}" to do so. Enter "O^{C}" to return to the usual keyboard layout.

Notes

1,2,3,5,6,7,8,9.

HP 2627A Terminal

Requirements

None. Roman Extension is standard.

Character Set Supported

USASCII plus Roman Extension

Configuring For 8-Bit Operation

Datacomm Configuration	Parity = None Chk Parity = No
Terminal Configuration	Language = Language of keyboard layout. ASCII 8-Bits = Yes
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing USASCII/Roman Extension Characters Not On Keyboard

If the keyboard layout is French or Spanish and LANGUAGE=FRANCAIS azM, FRANCAIS qwM, or ESPANOL M, a few Roman Extension characters (certain accented vowels) can be accessed from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character, and a single, merged character is transmitted to the system (in both character and block mode).

Access the USASCII or Roman Extension characters not on the keyboard by putting the keyboard in Foreign Characters mode. Enter ".^{c}" to do so. Find the keyboard location of any desired character in the HP 2627A Display Station Reference Manual (02627-90002). Enter ",^{c}" to return to the usual keyboard layout.

Notes

4.

HP 2631B Printer

Requirements

Roman Extension and katakana are now standard. Formerly option #008 (katakana) or #009 (Roman Extension) was required.

Character Set Supported

KANA8
USASCII plus Roman Extension

Configuring For 8-Bit Operation

Set the rocker switches on the Serial I/O Interface PCA (S2, inside the printer) as follows:

Switches 6,7	Set to 00 (both open). (Received eighth bit passed).

Set the rocker switches on the Printer Logic PCA (inside the printer) as follows:

In 1st Group of 7	Set Switch 7 = 0 (Open) (8-bit Datacomm).
In 2nd Group of 10	Set Switches 1-5 = 11111 (USASCII) ; 10110 (JISCII). Set Switches 6-10 = 10001 (Roman Extension) ; 10101 (katakana).
Front Panel Switches	Parity = 00 (None).
MPE I/O Configuration	Subtype = 14 (not supported if connection is ATC). Terminal Type = 20 or 22.

Notes

9,11,14.

HP 2635B Printer/Terminal

Requirements

Roman extension is now standard. Formerly one of options #001, 002, 003, 004, 005 or 006 (national keyboards) was required.

Character Set Supported

USASCII plus Roman Extension

Configuring For 8-Bit Operation

Set the rocker switches on the Serial I/O Interface PCA (S2, inside the printer) as follows:

Switches 6,7	Set 00 (both open). (Received eighth bit passed).

Set the rocker switches on the Printer Logic PCA (inside the terminal) as follows:

In 1st Group of 7	Set Switch 7 = 0 (Open) (8-bit Datacomm).
In 2nd Group of 10	Set Switches 1-5 = 11111 (USASCII). Set Switches 6-10 = 10001 (Roman Extension).

Set the rocker switches on the keyboard PCA (inside the terminal) as follows:

Set Switches 4-8	Set to language of terminal keyboard. Refer to the HP 2630B Family Reference Manual (02631-90918) for a list of keyboard layouts and the corresponding switch settings.
Front Panel Switch	Parity = None.
MPE I/O Configuration	Terminal Type = 15.

Notes

1,2,5,7,9,11.

HP 2645J Terminal

Requirements

None. Katakana is standard.

Character Set Supported

KANA8

Configuring For 8-Bit Operation

Datacomm Configuration	Parity = None
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing KANA8 Characters Not On Keyboard

Access the KANA8 characters not in JISCII by pressing the "katakana" key to enter katakana mode. Press the katakana key again to return the keyboard to its JISCII layout. Alternatively, press the right SHIFT key (once by itself) to enter katakana mode, and the left SHIFT key to exit from it.

Notes

9,12.

HP 2680A Printer

Requirements

Environment files ending in "X" for USASCII plus Roman Extension.
Environment files ending in "K" for KANA8.

Character Set Supported

USASCII plus Roman Extension
KANA8

Configuring For 8-Bit Operation

Use the environment files ending in "X" (for USASCII plus Roman Extension) or those ending in "K" (for KANA8).

Notes

9,11.

HP 2688A Printer

Requirements

Environment files COURxA, GOTHxA, LP88, PICAxA, PRESxA, ROMPxA, SCRPRA.

Character Set Supported

ROMAN8

Configuring For 8-Bit Operation

Use one of the environment files listed above for support of ROMAN8.

Notes

9,11.

HP 2700 Terminal

Requirements

None. Roman Extension is standard.

Character Set Supported

USASCII plus Roman Extension.

Configuring For 8-Bit Operation

Port1 or Port2 Configuration	Parity/DataBits = None/8. Chk Parity = No
Terminal Configuration	Language = Language of keyboard layout. ASCII 8-Bits = ON.
MPE I/O Configuration	Terminal Type = 10 (12 if connection is ATC).

Typing USASCII/Roman Extension Characters Not On Keyboard

If the keyboard layout is French or Spanish and LANGUAGE=FRANCAIS azM, FRANCAIS gwM, or ESPANOL M, a few Roman Extension characters (certain accented vowels) can be accessed from the standard keyboard by using mutes. Enter a non-spacing diacritical character, then the unaccented vowel. The screen displays a single, merged character, and a single, merged character is transmitted to the system (in both character and block mode).

Access the USASCII or Roman Extension characters not on the keyboard by putting the keyboard in Foreign Characters mode. Enter "$.^{C}$" to do so. Find the keyboard location of any desired character using the algorithm in the HP 2700 Family Alphanumeric Reference Manual (02703-90003). Enter "$,^{C}$" to return to the usual keyboard layout.

Notes

3,13.

HP 2932A/HP 2933A/HP 2934A Printers

Requirements

None. ROMAN8 and KANA8 character sets are standard.

Character Set Supported

ROMAN8, KANA8

Configuring For 8-Bit Operation

Printer	From the front panel, in the Printer Print Settings, set Primary Character Set = 1 (ROMAN8) or = 2 (KANA8). For serial interface, in the Interface Data Settings, set DataBits = 8, Parity = None. For Multipoint, set Parity = None, Code = ASCII8. These can also be done programmatically with escape sequences.
MPE I/O Configuration	For serial interface, configure the printer on your HP 3000 as Termtype = 20 (8 bits of data) (not supported via ATC connection or ADCC with HIOTERM0.) On a Multipoint line, use Terminal Type = 18 or 22.

Notes

None.

NOTES

The following Notes apply to the peripherals covered in this Appendix. Refer to the description of each peripheral for a list of which Notes apply to it.

1. When "N^C" (shift out) and "O^C" (shift in), are used to shift the keyboard out for Roman Extension, they are transmitted to the system when the terminal is in character mode. This results in superfluous data in the byte stream sent to the system.
(HP 2382, 2622, 2623, 2626, 2635)

2. When shift out and shift in are sent to the terminal they have no effect on the active character set (as expected by some software), but they do affect subsequent keyboard operation, as if they had been typed in.
(HP 2382, 2622, 2623, 2626, 2635)

3. When the keyboard is shifted out, (in Foreign Characters mode for the HP 2700 family), the space bar sends %240 instead of %40, and the DEL key sends %377 instead of %177.
(HP 2626, 2700)

4. When the keyboard is shifted out (in Foreign Characters mode for the HP 2627), the space bar sends %240 instead of %40, and the DEL key sends nothing. This has been fixed in the most recent versions of the 2622 and 2623 terminals. These will show as ROMs 1818-3199/3203 with Date Code 2313 or later (2622), and 1818-3223/3228 with Date Code 2335 or later (2623).
(HP 2382, 2622, 2623, 2627)

5. If "(ESCAPE))B" or "(ESCAPE))C" is entered or transmitted to the terminal, the alternate character set will be redefined (e.g., to line draw or math). This will cause all would be Roman Extension characters, whether displayed on the terminal or entered via one of the methods listed above, to appear as the corresponding line draw or math symbols (or blanks, if that alternate set is not present in the terminal). To remedy this, enter "O^C(ESCAPE))A" (on the HP 2626A, reset Alternate Set to A in the TERMINAL CONFIGURATION menu). Note that data entered or displayed while the terminal has another alternate character set defined is correct internally even though it may not display correctly on the terminal.
(HP 2382, 2622, 2623, 2626, 2635)

6. When the terminal is in block mode and one or more Roman Extension characters are entered (e.g., "ü"), then (ENTER) is pressed, what is transmitted to the system, and written to the buffer of the program reading from the terminal, is "(ESCAPE))ü". This is the terminal's way of compensating for Note 5. It means that when the data is sent back again from the computer, "ü" will always display this way, and not as the corresponding line draw or math symbol. It also means that there may be more information in the program buffer than the user or the programmer is expecting, or there is less room in that buffer for other information. Note that if the terminal is controlled by VPLUS/3000, it strips out the escape sequence before passing the data on to the calling program's buffer (and from there to the data file or data base).
(HP 2382, 2622, 2623, 2626)

7. For the languages FRANCAIS azM, FRANCAIS qwM, and ESPANOL M when mutes are used and the terminal is in character mode, two characters are sent to to the system although a single, merged character appears on the screen. This means that an incorrect two-byte representation of the accented character will be received by the program or file. The next time they are displayed the terminal will put them back together, provided the terminal is still configured for FRANCAIS azM, FRANCAIS qwM, or ESPANOL M. In block mode a single character (the correct ROMAN8 code for the merged character) is sent to the system.
(HP 2382, 2622, 2623, 2626, 2635)

8. When softkey labels which contain extended characters (in the range %200-%377) are received from the system, the extended characters are lost and the inverse video is turned off on the label.
(HP 2626)

9. This device does not actually support 8-bit character sets, but simulates them by handling two 7-bit character sets, a primary and an alternate. Legitimate data from real alternate character sets (line draw or math) cannot be used in a supported (standard) way together with general ROMAN8 (KANA8) data because these devices treat Roman Extension (katakana) as an alternate character set, in 8-bit mode. All alternate character sets are addressed by codes with the eighth bit set to one; Roman Extension (katakana) must share this position with the other alternate sets through the use of escape sequences ("ESCAPE)x"), and on the terminals shift-in/shift-out are unsuitable for invoking alternate sets. The practical result of this is that NLS will not support the use of alternate character sets together with ROMAN8 (KANA8) data on these devices. Configure the device for 8-bit mode as documented, then limit the data to (old) ROMAN8 (KANA8).
(HP 2382, 2608, 2622A, 2623A, 2626, 2631, 2635, 2645J, 2680, 2688)

10. For the French and Spanish keyboards, when mutes are used and a mute diacritical is entered followed by a space, the ROMAN8 codes for the diacritical and the space are both transmitted to the system, not just the ROMAN8 character for the diacritical.
(HP 2621B)

11. When a shift-out character is sent to the printer, it causes subsequent data (until a shift-in is sent) to be selected from the alternate character set, whether or not the eighth bit is on.
(HP 2608, 2631, 2635, 2680, 2688)

12. When the system sends an 8-bit character the terminal shifts into katakana mode until a 7-bit character is received. For example, switching terminal speed with the MPE :SPEED command sometimes results in the receipt of an 8-bit character from the system. The user will need to exit katakana mode before entering "MPE" to signal that the speed has been changed.
(HP 2645J)

13. When the terminal is in Block Format mode (e.g., under control of VPLUS), an attempt to read the character %254 (tilde-accent in ROMAN8) from an input field causes the read to hang.
(HP 2700)

14. Versions of the 2631B with Printer Logic PCA #02631-60225 are not supported, because switch 7 (8 bit datacomm) is ignored. It is possible to configure 8 bit datacomm on this PCA programmatically via an escape sequence; but the program must do so before every data transfer.
(HP 2631B)

CONVERTING 7-BIT TO 8-BIT DATA

APPENDIX F

Many Hewlett-Packard peripherals can be configured for 7-bit operation with one of the European language national substitution character sets. These peripherals must be converted to 8-bit operation to access Native Language Support (NLS) capability. NLS requires the use of 8-bit character sets which include USASCII and native language characters.

NLS for western European languages is based on the ROMAN8 character set in which the additional characters required are assigned to unique values between 128 and 255. It requires eight bits to hold the value of a ROMAN8 character. All the special European characters are accessible in ROMAN8 without losing any of the USASCII characters.

The 7-bit national substitution sets do not offer a full complement of characters. New characters replace existing ones. In FRANCAIS, for example, the graphic symbol "#" is not available. In Spanish and French, even the substitutions made are not sufficient to obtain all the necessary new characters. The use of mute characters is required. Mute characters provide a single graphic on the terminal screen or paper for two bytes of storage and two keystrokes. For example, an "é" in Spanish or French would be produced with an accent mark plus an "e", whereas ROMAN8 contains the "é" as a single character. In any one language, the graphic symbols for other European countries are not available at all. For example, a French user does not have access to the necessary characters to properly address a letter to someone in Germany. The ROMAN8 8-bit character set eliminates these problems.

National Substitution Sets

Many Hewlett-Packard peripherals support the 7-bit national substitution sets for the following languages. (They are listed here as they appear on the terminal configuration menus of the terminals which support them):

SVENSK/SUOMI
DANSK/NORSK
FRANCAIS M
FRANCAIS
DEUTSCH
UK
ESPANOL M
ESPANOL
ITALIANO (On a few devices only.)

These are 7-bit national substitution character sets or languages in which one or more of 12 USASCII graphic symbols are replaced by other graphic symbols required for the national language being used. The same 7-bit internal code is displayed as a different symbol than that assigned to it by USASCII. For example, in USASCII the decimal value 35 is assigned to the graphic symbol "#"; but in the FRANCAIS national substitution set, the same decimal value 35 is assigned to the graphic symbol "£".

Users who have been using these (HP 262X) terminals in 7-bit operation for many years may have a substantial investment in data which is encoded in one of these 7-bit national substitution character sets. Hewlett-Packard is making several conversion utilities available to convert this data to ROMAN8.

Conversion Utilities

Because NLS involves using full 8-bit character sets for all data, customers wanting to use the facility will need to configure their peripherals for 8-bit operation. (This is not possible for the HP 264X terminals.) The national substitution characters, if input on a terminal configured for 7-bit operation, will not display correctly on a terminal or printer configured for 8-bit operation.

Several utilities are available to convert existing data that has been input with an HP 262X terminal configured for 7-bit operation. Refer to Table F-1 for a listing of these utilities. The premise of these utilities is that users will run them once for each file which needs converting, and will configure all their peripherals for 8-bit operation. Thereafter, peripherals will only be used in 8-bit operation.

Table F-1. Conversion Utilities by File Type

File Type	Utility to be Used for Conversion
EDITOR files.	N7MF8CNV (text option).
Other MPE files which are all text.	N7MF8CNV (text option).
MPE files in which text data is organized in fields which need to start in fixed columns.	N7MF8CNV (text option; data option if language is FRANCAIS M or ESPANOL M).
MPE files which include some non text data (e.g., integer or real).	N7MF8CNV (data option).
IMAGE data bases.	I7DB8CNV.
VPLUS forms files.	V7FF8CNV.
HPWORD files.	HPWORD internal files have always been based on a subset of ROMAN8. No conversion is necessary.
TDP files.	Run N7MF8CNV and then change back whatever "\" is converted to in the chosen language in case you need the "\" for embedded TDP commands.

Conversion Algorithm

The conversion utilities convert records or fields from files which are assumed to have been created at an HP 262X terminal configured for 7-bit operation, and for a language other than USASCII. The conversion is from the HP 262X implementation of a European 7-bit substitution character set to the 8-bit ROMAN8 character set. This involves converting the values with which certain characters are stored in the file. Before conversion, the file should look correct on a HP 262X terminal configured for 7-bit operation with the appropriate substitution set. After conversion the file will look correct on any terminal configured for 8-bit operation.

Records and/or fields from files of all types are converted using the same algorithm which is expressed in Figure F-1. The conversion affects only the 12 characters shown in the table. All other characters remain unchanged.

To use this table, find the desired national substitution set on the left. The uppermost row shows the 7-bit decimal values for which substitutions may have been made. There are two rows of information opposite each national substitution set. The upper row shows the graphic assigned in 7-bit operation and the lower row the decimal value assigned the graphic in ROMAN8 after using the conversion algorithm.

When certain FRANCAIS M and ESPANOL M characters are followed immediately by certain other characters, the two-character combination is converted to a single ROMAN8 character, and the field or record being converted is padded at the end with a blank:

FRANCAIS M

^(94) followed by a, e, i, o, or u is converted to â(192), ê(193), î(209), ô(194), or û(195).

"(126) followed by a, e, i, o, or u is converted to ä(204), ë(205), ï(221), ö(206), ü(207).

"(126) followed by A, O, or U is converted to Ä(216), Ö(218), or Ü(219).

ESPANOL M

´(39) followed by a, e, i, o, or u is converted to á(196), é(197), í(213), ó(198), or ú(199).

If these characters are followed by any other character, they are converted to their ROMAN8 equivalent as shown in Figure F-1.

CHARACTER CONVERSION

Decimal Value of Character to be Converted

National Subst.Set	35	39	64	91	92	93	94	96	123	124	125	126
USASCII	#	'	@	[	\	]	^	`	{	|	}	~
SVE/SUOMI	#	'	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
	35	39	220	216	218	208	219	197	204	206	212	207
DANSK/NORSK	#	'	@	Æ	Ø	Å	^	`	æ	ø	å	~
	35	39	64	211	210	208	94	96	215	214	212	126
FRANCAIS	£	'	à	°	ç	§	^	`	é	ù	è	¨
	187	39	200	179	181	189	170	96	197	203	201	171
FRANCAIS M	£	'	à	°	ç	§	^	`	é	ù	è	¨
	187	39	200	179	181	189	170	96	197	203	201	171
DEUTSCH	£	'	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
	187	39	189	216	218	219	94	96	204	206	207	222
U K	£	'	@	[	\	]	^	`	{	|	}	~
	187	39	64	91	92	93	94	96	123	124	125	126
ESPANOL	#	'	@	¡	Ñ	¿	°	`	{	ñ	}	~
	35	39	64	184	182	185	179	96	123	183	125	126
ESPANOL M	#	´	@	¡	Ñ	¿	°	`	{	ñ	}	~
	35	168	64	184	182	185	179	96	123	183	125	126
ITALIANO	£	'	@	°	ç	é	^	ù	à	ò	è	ì
	187	39	64	179	181	197	94	203	200	202	201	217

Figure F-1. Character Conversion Data

Conversion Procedure

To convert 7-bit substitution data to 8-bit ROMAN8 data:

1. Determine which files need to be converted. A file must be converted if the data was input from an HP 262X terminal configured for 7-bit operation, or for a national substitution set other than USASCII.

2. Determine the national substitution set ("language" on the terminal configuration menu) from which the conversion should be done for each file. This is the language the HP 262X terminal was configured for at the time the file data was input.

3. Refer to Table F-1 to determine which utility should be used to convert each file.

4. Back up all files to be converted (:STORE to tape or SYSDUMP).

5. Run each utility, supplying it with the language and file names as determined above. Instructions for running each utility are found at the end of this Appendix.

6. Configure all terminals and printers for 8-bit operation. (At least one terminal must already be configured for 8-bit operation when the V7FF8CNV utility is run.) Refer to Appendix E, "PERIPHERAL CONFIGURATION."

Figure F-2 is a sample dialogue from a session executing N7MF8CNV for both text and data files.

```
:RUN N7MF8CNV.PUB.SYS

HP European 7-Bit character sets are:

  1. SVENSK/SUOMI
  2. DANSK/NORSK
  3. FRANCAIS M
  4. FRANCAIS
  5. DEUTSCH
  6. UK
  7. ESPANOL M
  8. ESPANOL
  9. ITALIANO

From which character set should conversion be done: 5
File types which can be converted are:

  1. MPE text files (each record converted as one field).
  2. MPE data files (define fields; only defined fields are converted).
  3. Test Conversion.

Type of file to be converted: 1

Name of text file to be converted: ABC

  112 records converted in ABC

Name of text file to be converted: RETURN
```

Figure F-2. N7MF8CNV Dialogue (1 of 2)

```
File types which can be converted are:

  1. MPE text files (each record converted as one field).
  2. MPE data files (define fields; only defined fields are converted).
  3. Test Conversion.

Type of file to be converted: 2

Name of data file to be converted: XYZ
Please supply one at a time the field to be converted (first byte is 1).
  Start, Length:  1,12
  Start, Length:  15,30
  Start, Length:  61, 6
  Start, Length:  RETURN

Data file XYZ: fields to be converted are:

 1,    12
15,    30
61,     6
Correct? RETURN
  287 records converted in XYZ

Name of data file to be converted: RETURN

File types which can be converted are:

  1. MPE text files (each record converted as one field).
  2. MPE data files (define fields; only defined fields are converted).
  3. Test Conversion.

Type of file to be converted: RETURN

HP European 7-Bit character sets are:

  1. SVENSK/SUOMI
  2. DANSK/NORSK
  3. FRANCAIS M
  4. FRANCAIS
  5. DEUTSCH
  6. UK
  7. ESPANOL M
  8. ESPANOL
  9. ITALIANO

From which character set should conversion be done: RETURN

END OF PROGRAM
:
```

Figure F-2. N7MF8CNV Dialogue (2 of 2)

N7MF8CNV Utility

N7MF8CNV converts data in EDIT/3000 and other MPE text and data files from a Hewlett-Packard 7-bit national substitution character set to ROMAN8. The user is prompted for language and file type (text or data). For a data file, the user will be prompted on each file for the starting position and length of each field (portion of a record) to be converted. For a text file, each record is converted as one field.

The user is prompted for the name of each file to be converted. Files are read one record at a time; each record is converted (or certain fields of it are converted for data files), and the result is written to a new temporary file. When all records have been read, converted and written to the new file, the old (unconverted) copy is deleted, and the new one saved in its place. An exception to this is KSAM files, which are converted in place, rather than written to a new temporary file. A count of the number of records read and converted is displayed on $STDLIST.

This utility will not convert files containing bytes with the eighth bit set. This situation probably indicates a misunderstanding or error. The likely causes are:

- File is not a text or data file.
- File is a data file for which the fields have been inaccurately located.
- File was created on a terminal configured for 8-bit operation.
- File has already been converted.

The maximum record length supported is 8192 bytes. The maximum number of fields supported in the records of a data file is 256.

If the file being converted contains user labels, these are copied to the new file without conversion. If a fatal error is encountered during the conversion (e.g., 8-bit data or file system error found) the conversion stops, the old copy of the file is saved, and the new copy is purged. The data is unchanged. An exception to this is KSAM files. Since these are converted in place, some records may already have been modified. KSAM files (including key file) should be restored from the backup tape to ensure a consistent copy.

A Y^C entered during conversion displays the number of records successfully converted and conversion continues. On variable length data files, if a field or portion of a field is beyond the length of the record just read, a warning is displayed and that field is not converted on that record. Other fields on the same record are converted, and processing continues with subsequent records. After each file has been converted, the user is prompted for another file name.

In addition to the text and data options, there is a test conversion option which shows how the conversion algorithm operates. The test conversion option must be run from a terminal configured for 7-bit operation with the chosen national substitution set. The user is instructed to enter a string, and the result of the conversion is displayed. The user does not have to switch back and forth between 7-bit and 8-bit operation to see the result. Each character converted is displayed as a decimal value in parentheses rather than graphically. Other characters are displayed unchanged.

At any point in the program, a [RETURN] exits the current program level at which the user is located. A [RETURN] in response to a request for the starting position and length of a field in a data file indicates that the definition of fields is complete, and the program proceeds with the conversion of the data file. A [RETURN] entered in response to a request for a text file name indicates the conversion of text files is complete; the program goes back to the question: "Type of file to be converted?".

I7DB8CNV Utility

I7DB8CNV converts the character data in an IMAGE data base from an Hewlett-Packard 7-bit national substitution set to ROMAN8. The program is a special version of the DBLOAD.PUB.SYS program, and the conversion is done as part of a data base load. The procedure for running I7DB8CNV is:

1. Run DBUNLOAD.PUB.SYS to unload your data base to tape.

2. Run DBUTIL.PUB.SYS,ERASE to erase the data in your data base.

3. Run I7DB8CNV to convert the data and load it back into your data base.

I7DB8CNV will request the following:

1. The 7-bit national substitution set from which the conversion is to be made.

2. The data base name.

3. The utility prompts the user: `Convert all data fields of type X or U.` "YES" or [RETURN] means "YES". If a "NO" is entered, the user will be prompted in each data set for each field of type U or X.

   The single field in an automatic data set is not proposed for conversion. Whether or not its values are converted depends on the response to the item(s) through which it is linked to detail data set(s). At the end of each data set, the user is asked to confirm that the correct fields to be converted from that data set have been selected. Again, a [RETURN] is treated as a "YES" answer. Enter "N" or "n" to change the data fields in that data set to be converted.

I7DB8CNV then loads the data base from tape. As each record is read, those fields which were selected have their data converted according to the algorithm for the 7-bit national substitution set which was selected at the beginning of the program.

I7DB8CNV will not allow 8-bit data (bytes with the high-order bit set) in the data fields it is trying to convert. The utility will not abort but the field in question will not be converted, and a warning will be issued:

```
** WARNING:  8-bit data encountered in item [itemname in DS data set].
```

If the program should abort for any reason during the conversion, the user must log on again to clear the temporary files used during the conversion process before running the program again.

Figure F-3 shows the dialogue from a sample run of the I7DB8CNV program.

```
:RUN I7DB8CNV.PUB.SYS

HP European 7-bit character sets are:

  1. SVENSK/SUOMI
  2. DANSK/NORSK
  3. FRANCAIS
  4. FRANCAIS M
  5. DEUTSCH
  6. U K
  7. ESPANOL
  8. ESPANOL M
  9. ITALIANO

From which character set should conversion be done: 2

WHICH DATA BASE: QWERTZ

Convert all fields of type U,X in all data sets (Y/N)? N

Data Set SET1 fields to be converted:
ITEM1          (Y/N)? RETURN
ITEM2          (Y/N)? RETURN
ITEM3          (Y/N)? N
ITEM4          (Y/N)? RETURN
Is Data Set SET1 correctly defined (Y/N)? RETURN

Data Set SET2 - Automatic Master

Data Set SET3 fields to be converted:
ITEM1          (Y/N)? RETURN
ITEM5          (Y/N)? N
ITEM6          (Y/N)? N
Is Data Set SET3 correctly defined (Y/N)? RETURN

DATA SET 1:    19 ENTRIES
DATA SET 2:     0 ENTRIES
DATA SET 3:    25 ENTRIES
END OF VOLUME 1, 0 READ ERRORS RECOVERED
DATA BASE LOADED

END OF PROGRAM
:
```

Figure F-3. I7DB8CNV Dialogue

V7FF8CNV Utility

V7FF8CNV converts text and literals in VPLUS/3000 forms files from a Hewlett-Packard 7-bit national substitution character set to ROMAN8. V7FF8CNV is a special version of FORMSPEC.PUB.SYS and is run the same way. Before running this utility back up the forms file (:STORE to tape or SYSDUMP), then:

1. Configure your terminal for 8-bit operation. (Refer to Appendix E, "PERIPHERAL CONFIGURATION," for information on specific terminal configuration.)

2. Run V7FF8CNV.PUB.SYS, stepping through each form, field definition, save field, function key label. As each screen is presented on the terminal, 7-bit substitution characters have already been converted to their ROMAN8 equivalent.

3. If the data is correct, press [ENTER] and proceed to the next screen. If not, correct the data, then press [ENTER] to continue.

4. After all screens are converted, recompile the forms file as usual.

Conversion applies to substitution characters found in all source records in VPLUS/3000 forms files with the following exception: substitution characters for "[" and "]" are not converted in screen source records since these indicate start and stop of data fields. The following would be converted:

- Text in screens.
- Function key labels.
- Initial values in save field definitions.
- Initial values in field definitions.
- Literals in processing specifications.

V7FF8CNV and Alternate Character Sets

Hewlett-Packard block-mode terminals which have the capability to handle all or part of ROMAN8 can be divided into two groups, based on how they handle alternate character sets when configured for 8-bit operation.

GROUP ONE - HP 2392A, 2625A, 2627A, 2628A, 2700, and 150. Use shift-out and shift-in characters to switch back and forth between an 8-bit base character set and an 8-bit alternate character set. This is the standard for new Hewlett-Packard terminals and printers.

GROUP TWO - HP 2622A, 2623A, 2626A, and 2382A. (Do not use an HP 2624A or HP 2624B as they are unable to handle 8-bit characters properly.) Group Two terminals use the eighth bit to switch back and forth between a 7-bit base character set and a 7-bit alternate character set. Therefore, it is not possible to get true 8-bit operation (ROMAN8) and use an alternate character set (e.g., line draw) at the same time because the base character set is not really 8-bit, but 7-bit with the additional characters defined in the alternate character set. Using both 8-bit ROMAN8 characters and line draw in the same file is not recommended since the user must continually redefine the alternate character set, switching back and forth between Roman Extension and the line drawing

character set. Shift-out and shift-in are ignored by the terminal, which goes to the alternate character set when the high order bit is on.

Files using alternate character sets on one group of terminals will not display correctly on the terminals of the other group, even when terminals from both groups are configured for 8-bit operation.

Therefore, the use of characters from an alternate set affects the conversion procedure. If the forms file does contain characters from an alternate character set, choose one of the following alternatives:

1. Eliminate the use of alternate character sets (either with FORMSPEC or while running V7FF8CNV).

2. Define alternate character sets to appear correctly on Group One terminals. This happens automatically when V7FF8CNV is run from a Group One terminal. Characters from these alternate sets will appear as USASCII characters on a Group Two terminal.

V7FF8CNV Operation

V7FF8CNV must be run on a terminal supported by VPLUS/3000 which supports display of all characters, enhancements and alternate characters sets used in the forms file. If alternate character sets are used, the HP 2392, 2625, 2627, 2628, 2700, or 150 are recommended.

The V7FF8CNV procedure is:

1. Configure your terminal type properly for 8-bit operation by using the settings recommended in Appendix E, "PERIPHERAL CONFIGURATION."

2. Run V7FF8CNV.PUB.SYS.. Respond to prompts for the terminal group and the national substitution set.

3. Press NEXT once to begin going through the forms file.

4. Press (ENTER) after each screen until the end of the forms file is reached. Two exceptions to Step 4 are:

   - Type "Y" in "Function key labels" on each FORM MENU and the GLOBALS MENU to see and convert function key labels.

   - On the field definition screen, if the processing specs have converted data which you want to save, press the FIELD TOGGLE key, then (ENTER) to save that conversion.

   NOTE

   If you try to redisplay a screen which has already been converted and this conversion has been saved by pressing (ENTER), a message "Form contains 8 bit data" will be displayed. Do not press (ENTER) again, but continue on through the forms file.

5. Compile your forms file as usual.

These conversion utilities are designed to be used once to update existing data to 8-bit compatibility.

APPLICATION GUIDELINES

APPENDIX G

Currently, the HP 3000 supports six conventional programming languages (SPL, FORTRAN, COBOLII, Pascal, RPG and BASIC). Some general guidelines and some specific to each of the supported programming languages are included in this Appendix to help the programmer select a language to use for writing a local language or localizable application.

All Programming Languages

- Create and use message catalogs. Do not hard-code any text messages, including prompts. For example, never require a hard-coded "Y" or "N" in response to a question. The equivalents of YES and NO for every language supported by NLS are available through a call to NLINFO item 8.

- Use the NLS date and time formatting intrinsics. Do not use the MPE intrinsics DATELINE, FMTCLOCK, FMTDATE and FMTCALENDAR. They all result in American-style output.

- Check a character's attribute, available through NLINFO item 12, to determine printability. Alternatively, use the NLREPCHAR intrinsic to check whether the character gets replaced or not. Do not use range checking on the binary value of a character to decide whether it is printable or not.

- Use the NLCOLLATE intrinsic to compare character strings. Do not compare character strings (IF abc > pqr ... , where abc and pqr are both character strings). Since these comparisons are based on binary values of characters as they appear in the USASCII sequence, they usually produce incorrect results. Obviously, this is not applicable in case an exact match is tested (IF abc = pqr ...).

- Use NLSCANMOVE for upshifting and downshifting. Do not upshift or downshift based on the character's binary value. For a...z in USASCII, upshifting can be done by subtracting 32 from the binary value. This does not work for all characters in all character sets.

- To determine whether a character is uppercase or lowercase use the character attributes table available through NLINFO item 12. Do not use a character's binary value in range checks to decide whether it is an uppercase or lowercase alphabetic character.

- Much Hewlett-Packard and user-written software assumes that numeric characters (0 through 9) are represented by code values 48 through 57 (decimal). In general, this is valid because standard Hewlett-Packard 8-bit character sets are supersets of USASCII. However, some character sets may have different or additional characters which should be treated as numeric. Therefore, if at all possible, avoid doing range checks on code values to recognize or process numeric characters. For recognition of numeric characters, interrogate the character attributes table, available through a call to NLINFO item 12.

- Use the NLTRANSLATE intrinsic, not CTRANSLATE, to translate to or from EBCDIC.

- Do your own formatting using the decimal separator, the thousands separator, and the currency symbol available through NLINFO items 9 and 10. Use the standard statements to output into a character string type variable. Replace the decimal and thousands separators by those required in the language being used. Do not use standard output statements (PRINT, WRITE) for real

numbers, since this formats them according to the definition of the programming language. This usually results in American formats with a period used as the decimal separator.

- Input data into a character string, and preprocess the string to replace any decimal or thousands separators used in the American formats. Then supply the string to the standard read statement. Standard input statements for real numbers (READ, ACCEPT) should not be used as they accept the period as the decimal separator. Many non-American users will input something else (a comma, for example).

- Always store standard formats for date and time (like those returned by FMTCALENDAR and FMTCLOCK) if dates or times have to be stored in files or data bases. Never store a date or a time in a local format. Intrinsics are available to convert from the standard format to a local format, but the reverse is not always possible.

- Do not use VPLUS/3000 terminal local edits. VPLUS/3000 edit processing specifications and terminal edit processing statements are separate and are not checked for compatibility. There will be no check that the designer has specified a terminal local edit which is consistent with the language-dependent symbol for the decimal point (DEC_TYPE_EUR, DEC_TYPE_US) in the configuration phase.

COBOLII (HP 32233A)

- Use the character attributes table of the character set being used to determine whether a character is ALPHABETIC or NUMERIC. This table is available through a call to NLINFO item 12. Do not use the COBOLII ALPHABETIC and NUMERIC class tests to determine this (e.g., `If data-item IS ALPHABETIC`).

- Do not use input-output translation by COBOLII from an EBCDIC character set by means of the ALPHABET-NAME clause and the CODE SET clause. Use the NLTRANSLATE intrinsic.

- Use the NLS date and time formatting intrinsics for display purposes. Do not use TIME-OF-DAY and CURRENT-DATE. These items are formatted in the conventional American way, and are unsuitable for use in many other countries.

- Use the COLLATING SEQUENCE IS *language-name* or the COLLATING SEQUENCE IS *language-ID* phrase in the enhanced SORT and MERGE statements to specify the language name or number whose collating sequence is to be used. Do not use the COLLATING SEQUENCE IS *alphabet-name* phrase for sorting and/or merging in COBOLII.

- In condition-name data descriptions (88-level items), avoid the THRU option in the VALUE clause (e.g., `88 SELECTED-ITEMS VALUE "A" THRU "F"`).

FORTRAN (HP 32102B)

- Format specifiers N and M will output in an American numerical format (with commas between thousands and a decimal point) or an American monetary format (like N, with a "$" added). Additional post processing will be required.

- Outputting logicals will result in a "T" (for true) or an "F" (for false). Similarly, "T" and "F" are expected for logical input. A non-English speaking user may want to use another character.

- The intrinsic functions RNUM, DNUM and STR all assume an American format in the input and produce an American formatted output.
- The EXTIN' and INEXT' entry points of the compiler library assume American formats. Do not use them.

SPL (HP 32100A)

- To determine whether or not the byte is alphabetic, numeric, or special, consult the character attribute table of the character set used. This table is available through NLINFO item 12. Do not use the IF xyz = (or <>) ALPHA (or NUMERIC or SPECIAL) construct to determine this.
- Do not use the MOVE ... WHILE construct or the MVBW machine instruction. It stops moving bytes based on the USASCII binary value of bytes, by which it determines whether the byte is alphabetic or numeric. Use the NLSCANMOVE intrinsic.

RPG (HP 32104A)

The features of NLS are accessed primarily through intrinsic calls. Using MPE and subsystem intrinsics from RPG requires expertise. For this reason, the use of RPG as a vehicle to write localizable applications or to access native language structures is not recommended. Some RPG functions, such as date and numeric formatting, provide some control for national custom differences, but the choices are very limited and can only be made by recompiling.

BASIC (HP 32101B)

The features of NLS are accessed primarily through intrinsic calls. Since most intrinsics are not callable from BASIC, the use of BASIC as a language to write localizable programs is not supported.

Pascal (HP 32106A)

A type of CHAR indicates an 8-bit entity, and thus allows processing of 8-bit characters without problems.

EXAMPLE PROGRAMS

APPENDIX H

The example programs in this Appendix demonstrate calls to NLS-related intrinsics from several programming languages. They are not intended to be used as application programs.

A. Using SORT In A COBOLII Program

This program shows how to sort an input file (formal designator INPTFILE) to an output file (formal designator OUTPFILE) using a COBOLII SORT verb.

Lines 3.5 and 4.1 show how to specify the language to determine the collating sequence.

```
1     $CONTROL USLINIT
1.1    IDENTIFICATION DIVISION.
1.2    PROGRAM-ID.    EXAMPLE.
1.3   * ------------------------------------------------
1.4    ENVIRONMENT DIVISION.
1.5    INPUT-OUTPUT SECTION.
1.6    FILE-CONTROL.
1.7    SELECT INPTFILE ASSIGN TO "INPTFILE".
1.8    SELECT OUTPFILE ASSIGN TO "OUTPFILE".
1.9    SELECT SORTFILE ASSIGN TO "SORTFILE".
2     * ------------------------------------------------
2.1    DATA DIVISION.
2.2    FILE SECTION.
2.3    SD   SORTFILE.
2.4    01   SORTFILE-RECORD.
2.5         05  SORTFILE-KEY    PIC X(4).
2.6         05  FILLER          PIC X(68).
2.7
2.8    FD   INPTFILE.
2.9    01   INPTFILE-RECORD     PIC X(72).
3
3.1    FD   OUTPFILE.
3.2    01   OUTPFILE-RECORD     PIC X(72).
3.3
3.4    WORKING-STORAGE SECTION.
3.5    01   LANGUAGE            PIC S9(4) COMP VALUE 12.
3.6   * ------------------------------------------------
3.7    PROCEDURE DIVISION.
3.8    MAIN SECTION.
3.9        SORT SORTFILE
4               ASCENDING SORTFILE-KEY
4.1             SEQUENCE IS LANGUAGE
4.2             USING  INPTFILE
4.3             GIVING OUTPFILE.
4.4        STOP RUN.
```

Line 3.5 could be written also as:

```
3.5     01    LANGUAGE            PIC X(16) VALUE "SPANISH ".
```

In the example execution the input and output files are associated with the terminal ($STDIN and $STDLIST):

```
:FILE INPTFILE=$STDIN
:FILE OUTPFILE=$STDLIST
:RUN PROGRAM;MAXDATA=12000

character
credit
DEBIT
:EOD

credit
character
DEBIT

END OF PROGRAM
:
```

B. Using SORT In A Pascal Program

This program shows how to sort an input file (formal designator INPF) to an output file (formal designator OUTF) using SORTINIT intrinsic call.

```
$USLINIT$
$STANDARD_LEVEL 'HP3000'$

PROGRAM example (inpf,outf);

TYPE
   smallint  = -32768 .. 32767;

   sort_rec  = RECORD
                 position:  smallint;
                 length:    smallint;
                 seq_type:  smallint;
               END;

   char_seq  = RECORD
                 array_code:smallint;
                 language:  smallint;
               END;

   file_arr  = RECORD
                 num_file:  smallint;
                 num_zero:  smallint;
               END;

   file_rec  = PACKED ARRAY [1..72] of CHAR;

   file_num  = FILE of file_rec;

VAR
   numkeys: smallint;
   reclen:  smallint;
   keys:    sort_rec;
   cseq:    char_seq;
   inp:     file_arr;
   out:     file_arr;
   inpf:    file_num;
   outf:    file_num;

PROCEDURE sortinit;   INTRINSIC;
PROCEDURE sortend;    INTRINSIC;

PROCEDURE main;
BEGIN
   numkeys := 1;
   reclen  :=72;

   WITH keys DO
   BEGIN
     posltion := 1;
     length   := 4;
```

```
51          seq_type := 9;
52        END;
53
54        WITH cseq DO
55        BEGIN
56          array_code:=1;
57          language:= 12;
58        END;
59
60        WITH inp  DO
61        BEGIN
62          RESET (inpf);
63          num_file := FNUM (inpf);
64          num_zero := 0;
65        END;
66
67        WITH out  DO
68        BEGIN
69          REWRITE (outf);
70          num_file := FNUM (outf);
71          num_zero := 0;
72        END;
73
74        sortinit (inp,out,,reclen,,numkeys,keys,,,,,,,,cseq);
75        sortend;
76
77    END;
78
79    BEGIN
80       main;
81    END.
```

In the example execution the input and output files are associated with the terminal ($STDIN and $STDLIST):

```
:FILE INPF=$STDIN
:FILE OUTF=$STDLIST
:RUN PROGRAM;MAXDATA=12000

character
credit
DEBIT
:EOD

credit
character
DEBIT

END OF PROGRAM
:
```

C. Using SORT In A FORTRAN Program

This program shows how to sort an input file (formal designator FTN21) to an output file (formal designator FTN22) using SORTINIT intrinsic call.

```
1       $CONTROL USLINIT,FILE=21-22
2             PROGRAM EXMP
3             INTEGER FNUM
4             INTEGER N(4)
5             INTEGER KEYS (3)
6             INTEGER CSEQ (2)
7             SYSTEM INTRINSIC SORTINIT, SORTEND
8       C
9       C      KEY (3) = 9  character type key
10      C      CSEQ(2) = 12 Spanish collating sequence
11      C
12            KEYS (1) = 1
13            KEYS (2) = 4
14            KEYS (3) = 9
15            CSEQ (1) = 1
16            CSEQ (2) = 12
17      C
18      C     Sort file FTN21 into FTN22
19      C
20            N (1) = FNUM (21)
21            N (3) = FNUM (22)
22            N (2) = 0
23            N (4) = 0
24            CALL SORTINIT (N(1),N(3),,,,1,KEYS,,,,,,,,CSEQ)
25            CALL SORTEND
26            STOP
27            END
```

In the example execution the input and output files are associated with the terminal ($STDIN and $STDLIST):

```
:FILE FTN21=$STDIN
:FILE FTN22=$STDLIST
:RUN PROGRAM;MAXDATA=12000

character
credit
DEBIT
:EOD

credit
character
DEBIT

END OF PROGRAM
:
```

D. Using DATE/TIME Formatting Intrinsics In A FORTRAN Program

The user is asked to enter a language. All date and time formatting and conversion is done by using the language entered by the user. The time and date used in the examples is the current system time obtained by calling the HP 3000 system intrinsics CALENDAR and CLOCK.

```
$CONTROL USLINIT
      PROGRAM EXAMPLE
      LOGICAL LANGUAGE(8)
      CHARACTER *16 BLANGUAGE
C
      LOGICAL LERROR(2)
      INTEGER IERROR(2)
C
      CHARACTER *13 BCUSTOMDATE
      CHARACTER *28 BDATE
      CHARACTER *18 BCALENDAR
      CHARACTER  *8 BCLOCK
C
      LOGICAL LWEEKDAYS(42)
      CHARACTER *12 BWEEKDAYS(7)
C
      LOGICAL LMONTHS(72)
      CHARACTER *12 BMONTHS(12)
C
      EQUIVALENCE (LANGUAGE, BLANGUAGE)
      EQUIVALENCE (LWEEKDAYS,BWEEKDAYS)
      EQUIVALENCE (LMONTHS,  BMONTHS)
      EQUIVALENCE (LERROR,   IERROR)
      LOGICAL DATE
      INTEGER *4 TIME
      INTEGER LANGNUM, LGTH, WEEKDAY, MONTH
      SYSTEM INTRINSIC CLOCK, CALENDAR, ALMANAC, NLINFO,
     #       NLFMTCLOCK, QUIT, NLCONVCLOCK, NLFMTDATE,
     #       NLFMTCALENDAR, NLFMTCUSTDATE, NLCONVCUSTDATE
C
1001  FORMAT (1X,A12)
1002  FORMAT (1X,A13)
1003  FORMAT (1X,A18)
1004  FORMAT (1X,A8)
1005  FORMAT (1X,A28)
2001  FORMAT (A16)
2002  FORMAT (A1)
C
1     WRITE (6,*)
     #"ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):"
      READ (5, 2001) BLANGUAGE
C
C     NLINFO item 22 returns the corresponding
C     lang number in integer format for this language.
C
      CALL NLINFO (22, LANGUAGE, LANGNUM, LERROR)
      IF (IERROR(1) .EQ. 0) GO TO 400
C
C
```

```
50    100   IF (IERROR(1) .NE. 1) GO TO 200
51    C
52          WRITE (6, *) "NLS IS NOT INSTALLED"
53          CALL QUIT (1001)
54    C
55    200   IF (IERROR(1) .NE. 2) GO TO 300
56    C
57          WRITE (6, *) "THIS LANGUAGE IS NOT CONFIGURED"
58          CALL QUIT (1002)
59    C
60    300   CALL QUIT (1000 + IERROR(1))
61    C
62    C     This obtains the machine internal clock and calendar
63    C     formats, which are provided by the HP 3000 intrinsics.
64    C
65    400   TIME = CLOCK
66          DATE = CALENDAR
67    C
68    C     Call ALMANAC and convert the machine internal
69    C     date format into numeric values, which will be used
70    C     as indices into the name tables.
71    C
72          CALL ALMANAC(DATE, LERROR, , MONTH, ,WEEKDAY)
73          IF (IERROR(1) .NE. 0) CALL QUIT (2000 + IERROR(1))
74    C
75    C     Call the tables for month and weekday names and
76    C     display todays day name and the current month's name.
77    C
78          CALL NLINFO(5, LMONTHS, LANGNUM, LERROR)
79          IF (IERROR(1) .NE. 0) CALL QUIT (3000 + IERROR(1))
80    C
81          WRITE (6, 1001) BMONTHS (MONTH)
82    C
83          CALL NLINFO(7, LWEEKDAYS, LANGNUM, LERROR)
84          IF (IERROR(1) .NE. 0) CALL QUIT (4000 + IERROR(1))
85    C
86          WRITE (6, 1001) BWEEKDAYS (WEEKDAY)
87    C
88    C     Format the machine internal date format
89    C     into the custom date format (short version).
90    C     The result will be displayed.
91    C
92          CALL NLFMTCUSTDATE (DATE, BCUSTOMDATE, LANGNUM, LERROR)
93          IF (IERROR(1) .NE. 0) CALL QUIT (5000 + IERROR(1))
94    C
95          WRITE (6,*) "CUSTOM DATE:"
96          WRITE (6,1002) BCUSTOMDATE
97    C
98    C     Use the output of NLFMTCUSTDATE as input for
99    C     NLCONVCUSTDATE and convert back to the internal format.
100   C
101         DATE = NLCONVCUSTDATE(BCUSTOMDATE, 13, LANGNUM, LERROR)
102         IF (IERROR(1) .NE. 0) CALL QUIT (6000 + IERROR(1))
103   C
104   C     Format the machine internal date format into the
105   C     date format (long format) according to the language.
```

```
106     C       The result will be displayed.
107     C
108             CALL NLFMTCALENDAR(DATE, BCALENDAR, LANGNUM, LERROR)
109             IF (IERROR(1) .NE. 0) CALL QUIT (7000 + IERROR(1))
110     C
111             WRITE (6,*) "DATE FORMAT:"
112             WRITE (6,1003) BCALENDAR
113     C
114     C       Format the machine internal time format into the
115     C       language-dependent clock format.
116     C       The result will be displayed.
117     C
118             CALL NLFMTCLOCK(TIME, BCLOCK, LANGNUM, LERROR)
119             IF (IERROR(1) .NE. 0) CALL QUIT (8000 + IERROR(1))
120     C
121             WRITE (6,*) "TIME FORMAT:"
122             WRITE (6,1004) BCLOCK
123     C
124     C       Use the output of NLFMTCLOCK as input for
125     C       NLCONVCLOCK and convert back to the internal format.
126     C
127             TIME = NLCONVCLOCK(BCLOCK, 8, LANGNUM, LERROR)
128             IF (IERROR(1) .NE. 0) CALL QUIT (9000 + IERROR(1))
129     C
130     C       Format the machine internal time and date format
131     C       into the language dependent format.
132     C       The result will be displayed.
133     C
134             CALL NLFMTDATE(DATE, TIME, BDATE, LANGNUM, LERROR)
135             IF (IERROR(1) .NE. 0) CALL QUIT (10000 + IERROR(1))
136     C
137             WRITE (6,*) "DATE AND TIME FORMAT:"
138             WRITE (6, 1005) BDATE
139     C
140     C
141             STOP
142             END
```

Executing the program gives the following result:

```
:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
NATIVE-3000
JANUARY
TUESDAY
CUSTOM DATE:
01/31/84
DATE FORMAT:
TUE, JAN 31, 1984
TIME FORMAT:
5:15 PM
DATE AND TIME FORMAT:
TUE, JAN 31, 1984,  5:15 PM
```

```
END OF PROGRAM

:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
8
Januar
Dienstag
CUSTOM DATE:
31.01.84
DATE FORMAT:
Di., 31. Jan. 1984
TIME FORMAT:
17:15
DATE AND TIME FORMAT:
Di., 31. Jan. 1984, 17:15

END OF PROGRAM
:
```

E. Using The DATE/TIME Formatting Intrinsics In An SPL Program

The user is asked to enter a language. All date and time formatting and conversion is done by using the language entered by the user. The time and date used in the examples is the current system time obtained by calling the HP 3000 system intrinsics CALENDAR and CLOCK.

```
$CONTROL USLINIT
BEGIN
   LOGICAL ARRAY
      L'ERROR        (0:1),
      L'LANGUAGE     (0:7),
      L'PRINT        (0:39),
      L'CUSTOM'DATE  (0:6),
      L'DATE         (0:13),
      L'CALENDAR     (0:8),
      L'MONTHS       (0:71),
      L'WEEKDAYS     (0:41),
      L'CLOCK        (0:3);

   BYTE ARRAY
      B'PRINT(*)        = L'PRINT,
      B'CUSTOM'DATE(*)  = L'CUSTOM'DATE,
      B'CALENDAR(*)     = L'CALENDAR,
      B'DATE(*)         = L'DATE,
      B'MONTHS(*)       = L'MONTHS,
      B'WEEKDAYS(*)     = L'WEEKDAYS,
      B'CLOCK(*)        = L'CLOCK;

   BYTE POINTER
      BP'PRINT;

   DOUBLE
      TIME;

   LOGICAL
      DATE,
      HOUR'MINUTE = TIME,
      SECONDS     = TIME + 1;

   INTEGER
      YEAR,
      MONTH,
      DAY,
      WEEKDAY,
      LGTH,
      LANGNUM;

   DEFINE
      WEEKDAY'NAME = B'WEEKDAYS((WEEKDAY - 1) * 12)#,

      MONTH'NAME   = B'MONTHS((MONTH - 1) * 12)#,

      ERR'CHECK    = IF L'ERROR(0) <> 0 THEN.
                        QUIT #,

```

```
50          CCNE          = IF <> THEN
51                              QUIT #,
52
53          DISPLAY       = MOVE B'PRINT := #,
54
55          ON'STDLIST    = ,2;
56                          @BP'PRINT := TOS;
57                          LGTH := LOGICAL(@BP'PRINT) -
58                                  LOGICAL(@B'PRINT);
59                          PRINT(L'PRINT, -LGTH, 0) #;
60
61        INTRINSIC
62          READ,
63          QUIT,
64          PRINT,
65          CLOCK,
66          CALENDAR,
67          ALMANAC,
68          NLINFO,
69          NLFMTCLOCK,
70          NLCONVCLOCK,
71          NLFMTDATE,
72          NLFMTCALENDAR,
73          NLFMTCUSTDATE,
74          NLCONVCUSTDATE;
75
76
77      << Start of main code.
78         The user is asked to enter a language name or number.>>
79
80         DISPLAY
81          "ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):"
82         ON'STDLIST;
83
84         READ(L'LANGUAGE,-16);
85
86      << NLINFO item 22 returns the corresponding
87         lang number in integer format for this language.      >>
88
89         NLINFO(22,L'LANGUAGE,LANGNUM,L'ERROR);
90         IF L'ERROR(0) <> 0 THEN
91            BEGIN
92               IF L'ERROR(0) = 1 THEN
93                  BEGIN
94                     DISPLAY
95                     "NL/3000 IS NOT INSTALLED"
96                     ON'STDLIST;
97                     QUIT(1001);
98                  END
99               ELSE
100                 IF L'ERROR(0) = 2 THEN
101                    BEGIN
102                       DISPLAY
103                       "THIS LANGUAGE IS NOT CONFIGURED"
104                       ON'STDLIST;
105                       QUIT(1002);
```

```
106                 END
107               ELSE
108                 QUIT (1000 + L'ERROR(0));
109         END;
110
111    << This obtains the machine internal clock and
112       calendar formats which is maintained by MPE.          >>
113
114       TIME := CLOCK;
115
116       DATE := CALENDAR;
117
118    << Call ALMANAC and convert the machine internal date
119       format into numeric values, which will be used as indices
120       into the name tables.                                 >>
121
122       ALMANAC(DATE, L'ERROR, , MONTH, , WEEKDAY);
123       ERR'CHECK (2000 + L'ERROR(0));
124
125    << Call the tables for month and weekday names and
126       display todays day name and the current month's name.  >>
127
128       NLINFO(5, L'MONTHS, LANGNUM, L'ERROR);
129       ERR'CHECK (3000 + L'ERROR(0));
130
131       DISPLAY MONTH'NAME,(12) ON'STDLIST;
132
133       NLINFO(7, L'WEEKDAYS, LANGNUM, L'ERROR);
134       ERR'CHECK (4000 + L'ERROR(0));
135
136       DISPLAY WEEKDAY'NAME,(12) ON'STDLIST;
137
138    << Format the machine internal date format
139       into the custom date format (short version).
140       The result will be displayed.                         >>
141
142       NLFMTCUSTDATE(DATE,L'CUSTOM'DATE,LANGNUM,L'ERROR);
143       ERR'CHECK (5000 + L'ERROR(0));
144
145       DISPLAY "CUSTOM DATE:"     ON'STDLIST;
146       DISPLAY B'CUSTOM'DATE,(13) ON'STDLIST;
147
148    << Use the output of NLFMTCUSTDATE as input for
149       NLCONVCUSTDATE and convert back to the internal format.>>
150
151       DATE := NLCONVCUSTDATE(B'CUSTOM'DATE,13,LANGNUM,L'ERROR);
152       ERR'CHECK (6000 + L'ERROR(0));
153
154    << Format the machine internal date format into the       >>
155    << date format (long format) according to the language.   >>
156    << The result will be displayed.                         >>
157
158       NLFMTCALENDAR(DATE,L'CALENDAR,LANGNUM,L'ERROR);
159       ERR'CHECK (7000 + L'ERROR(0));
160
161       DISPLAY "DATE FORMAT:"  ON'STDLIST;
```

```
162       DISPLAY B'CALENDAR,(18) ON'STDLIST;
163
164    << Format the machine internal clock format
165       into the language-dependent clock format.
166       The result will be displayed.                          >>
167
168       NLFMTCLOCK(TIME,L'CLOCK,LANGNUM,L'ERROR);
169       ERR'CHECK (8000 + L'ERROR(0));
170
171       DISPLAY "TIME FORMAT:" ON'STDLIST;
172       DISPLAY B'CLOCK,(8)    ON'STDLIST;
173
174    << Use the output of NLFMTCLOCK as input for
175       NLCONVCLOCK and convert back to the internal format. >>
176
177       TIME := NLCONVCLOCK(B'CLOCK,8,LANGNUM,L'ERROR);
178       ERR'CHECK (9000 + L'ERROR(0));
179
180    << Format the machine internal time and date
181       format into the language-dependent format.
182       The result will be displayed.                          >>
183
184       NLFMTDATE(DATE,TIME,L'DATE,LANGNUM,L'ERROR);
185       ERR'CHECK (10000 + L'ERROR(0));
186
187       DISPLAY "DATE AND TIME FORMAT:" ON'STDLIST;
188       DISPLAY B'DATE,(28)    ON'STDLIST;
189
190    END.
```

Executing the program results in the following:

```
:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
GERMAN
Januar
Dienstag
CUSTOM DATE:
31.01.84
DATE FORMAT:
Di., 31. Jan. 1984
TIME FORMAT:
17:12
DATE AND TIME FORMAT:
Di., 31. Jan. 1984, 17:12

END OF PROGRAM

:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
0
JANUARY
TUESDAY
```

```
CUSTOM DATE:
01/31/84
DATE FORMAT:
TUE, JAN 31, 1984
TIME FORMAT:
5:13 PM
DATE AND TIME FORMAT:
TUE, JAN 31, 1984,  5:13 PM

END OF PROGRAM
:
```

F. Using The NLSCANMOVE Intrinsic In A COBOLII Program

In this program there are six different calls to NLSCANMOVE. In every call all parameters are passed to NLSCANMOVE. Since the upshift/downshift table and the character attributes table are optional parameters, they may be omitted. For performance reasons (if NLSCANMOVE is called frequently) they should be passed to the intrinsic after being read in by the appropriate calls to NLINFO.

```
1     $CONTROL USLINIT
1.1    IDENTIFICATION DIVISION.
1.2        PROGRAM-ID. EXAMPLE.
1.3        AUTHOR. LORO.
1.4    ENVIRONMENT DIVISION.
1.5    DATA DIVISION.
1.6    WORKING-STORAGE SECTION.
1.7       77       QUITPARM              PIC S9(4) COMP VALUE 0.
1.8       77       LANGNUM               PIC S9(4) COMP VALUE 0.
1.9       77       FLAGS                 PIC S9(4) COMP VALUE 0.
2         77       LEN                   PIC S9(4) COMP VALUE 70.
2.1       77       NUMCHAR               PIC S9(4) COMP VALUE 0.
2.2
2.3       01       TABLES.
2.4         05     CHARSET-TABLE         PIC X(256) VALUE SPACES.
2.5         05     UPSHIFT-TABLE         PIC X(256) VALUE SPACES.
2.6         05     DOWNSHIFT-TABLE       PIC X(256) VALUE SPACES.
2.7
2.8       01       STRINGS.
2.9         05     INSTRING.
3             10   INSTR1                PIC X(40) VALUE SPACES.
3.1           10   INSTR2                PIC X(30) VALUE SPACES.
3.2         05     OUTSTRING             PIC X(70) VALUE SPACES.
3.3         05     LANGUAGE              PIC X(16) VALUE SPACES.
3.4
3.5       01       ERRORS.
3.6         05     ERR1                  PIC S9(4) COMP.
3.7         88     NO-NLS                          VALUE 1.
3.8         88     NOT-CONFIG                      VALUE 2.
3.9         05     ERR2                  PIC S9(4) COMP VALUE 0.
4
4.1    PROCEDURE DIVISION.
4.2    START-PGM.
4.3   *  Initializing the arrays.
4.4
4.5        MOVE "abCDfg6ijkaÆÄbøcGjGf1f$E!SÅüÑdäeÉ1a23%&7"
4.6        TO INSTR1.
4.7        MOVE "a  123&i12fÆÄgøhk1KLabCDASÅüÑi"
4.8        TO INSTR2.
4.9
5     *  The user is asked to enter a language name or number.
5.1
5.2        DISPLAY
5.3        "ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):".
5.4        ACCEPT LANGUAGE.
5.5
5.6    CONVERT-NAME-NUM.
5.7   *  NLINFO item 22 returns the corresponding
```

```
5.8  *  lang number in integer format for this language.
5.9
6          CALL INTRINSIC "NLINFO" USING 22,
6.1                                      LANGUAGE,
6.2                                      LANGNUM,
6.3                                      ERRORS.
6.4        IF ERR1 NOT EQUAL 0
6.5           IF NO-NLS
6.6              DISPLAY "NL/3000 IS NOT INSTALLED"
6.7              CALL INTRINSIC "QUIT" USING 1001
6.8           ELSE
6.9              IF NOT-CONFIG
7                   DISPLAY "THIS LANGUAGE IS NOT CONFIGURED"
7.1                 CALL INTRINSIC "QUIT" USING 1002
7.2              ELSE
7.3                 COMPUTE QUITPARM = 1000 + ERR1
7.4                 CALL INTRINSIC "QUIT" USING QUITPARM.
7.5
7.6   GET-TABLES.
7.7  *  Obtain the character attributes table
7.8  *  using NLINFO item 12.
7.9
8          CALL INTRINSIC "NLINFO" USING 12,
8.1                                      CHARSET-TABLE,
8.2                                      LANGNUM,
8.3                                      ERRORS.
8.4        IF ERR1 NOT EQUAL 0
8.5           COMPUTE QUITPARM = 2000 + ERR1
8.6           CALL INTRINSIC "QUIT" USING QUITPARM.
8.7
8.8  *  Obtain the upshift table using NLINFO item 15.
8.9
9          CALL INTRINSIC "NLINFO" USING 15,
9.1                                      UPSHIFT-TABLE,
9.2                                      LANGNUM,
9.3                                      ERRORS.
9.4        IF ERR1 NOT EQUAL 0
9.5           COMPUTE QUITPARM = 3000 + ERR1
9.6           CALL INTRINSIC "QUIT" USING QUITPARM.
9.7
9.8  *  Obtain the downshift table using NLINFO item 16.
9.9
10         CALL INTRINSIC "NLINFO" USING 16
10.1                                     DOWNSHIFT-TABLE,
10.2                                     LANGNUM,
10.3                                     ERRORS.
10.4       IF ERR1 NOT EQUAL 0
10.5          COMPUTE QUITPARM = 4000 + ERR1
10.6          CALL INTRINSIC "QUIT" USING QUITPARM.
10.7
10.8       DISPLAY "THE FOLLOWING STRING IS USED IN ALL EXAMPLES:"
10.9       DISPLAY INSTRING.
11
11.1   EXAMPLE-1-1.
11.2  *  The string passed in the array instring should be moved
11.3  *  and upshifted simultaneously to the array outstring.
```

```
11.4  *  Set the until flag (bit 11 = 1) and the
11.5  *  upshift flag (bit 10 = 1).  All other flags remain 0.
11.6  *
11.7  *     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
11.8  *     0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0  =  60(octal) = 48(dec)
11.9  *
12    *  Note: The 'until flag' is set.  Therefore, the operation continues
12.1  *        until one of the ending criteria will be true.
12.2  *        If no ending condition is set, the operation
12.3  *        continues for the number of characters contained in
12.4  *        length.
12.5        MOVE 48    TO FLAGS.
12.6
12.7        CALL INTRINSIC "NLSCANMOVE" USING INSTRING,
12.8                                          OUTSTRING,
12.9                                          FLAGS,
13                                            LEN,
13.1                                          LANGNUM,
13.2                                          ERRORS,
13.3                                          CHARSET-TABLE,
13.4                                          UPSHIFT-TABLE
13.5                                    GIVING NUMCHAR.
13.6         IF ERR1 NOT EQUAL 0
13.7            COMPUTE QUITPARM = 5000 + ERR1
13.8            CALL INTRINSIC "QUIT" USING QUITPARM.
13.9
14           DISPLAY "UPSHIFTED:  (EXAMPLE 1-1)".
14.1         DISPLAY OUTSTRING.
14.2
14.3    EXAMPLE-1-2.
14.4  *
14.5  *  The string passed in the array instring should be moved
14.6  *  and upshifted to the array outstring (same as EXAMPLE 1-1).
14.7  *  Set the while flag (bit 11 = 0) and the upshift flag
14.8  *  (bit 10 = 1).  In addition all ending conditions will be
14.9  *  set (bits 12 - 15 all 1).
15    *
15.1  *    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5  BITS
15.2  *    0 0 0 0 0 0 0 0 0 0 1 0 1 1 1 1  = 57(octal) = 47(dec.)
15.3  *
15.4  *  Note: The 'while flag' is set.  Therefore, the operation
15.5  *        continues while one of the end criteria is true.
15.6  *        Since all criteria are set, one of them will be
15.7  *        always true, and the operation continues for the
15.8  *        number of characters contained in length.
15.9
16           MOVE SPACES  TO OUTSTRING.
16.1         MOVE 0       TO FLAGS.
16.2         MOVE 47      TO FLAGS.
16.3
16.4         CALL INTRINSIC "NLSCANMOVE" USING INSTRING,
16.5                                           OUTSTRING,
16.6                                           FLAGS,
16.7                                           LEN,
16.8                                           LANGNUM,
16.9                                           ERRORS,
```

```
17                                          CHARSET-TABLE,
17.1                                        UPSHIFT-TABLE
17.2                                GIVING NUMCHAR.
17.3
17.4        IF ERR1 NOT EQUAL 0
17.5           CALL INTRINSIC "QUIT" USING 6.
17.6
17.7        DISPLAY "UPSHIFTED:  (EXAMPLE 1-2)".
17.8        DISPLAY OUTSTRING.
17.9
18      EXAMPLE-2-1.
18.1  *  The string passed in the array instring should be
18.2  *  scanned for the first occurrence of a special character.
18.3  *  All characters before the first special character are
18.4  *  moved to outstring.
18.5  *  Set the until flag (bit 11 = 1) and the special
18.6  *  character flag (bit 12 = 1). All other flags remain zero.
18.7  *
18.8  *    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5  BITS
18.9  *    0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0  =  30(octal) = 24(dec.)
19    *
19.1  *  Note: The 'until flag' is set and the ending condition is
19.2  *        set to 'special character'.  Therefore, the operation
19.3  *        continues until the first special character is found
19.4  *        or until the number of characters contained in
19.5  *        length is processed.
19.6
19.7        MOVE SPACES  TO OUTSTRING.
19.8
19.9        MOVE 24      TO FLAGS.
20
20.1        CALL INTRINSIC "NLSCANMOVE" USING INSTRING,
20.2                                          OUTSTRING,
20.3                                          FLAGS,
20.4                                          LEN,
20.5                                          LANGNUM,
20.6                                          ERRORS,
20.7                                          CHARSET-TABLE,
20.8                                          UPSHIFT-TABLE
20.9                                  GIVING NUMCHAR.
21          IF ERR1 NOT EQUAL 0
21.1           COMPUTE QUITPARM = 7000 + ERR1
21.2           CALL INTRINSIC "QUIT" USING QUITPARM.
21.3
21.4        DISPLAY "SCAN/MOVE  UNTIL SPECIAL:  (EXAMPLE 2-1)".
21.5        DISPLAY OUTSTRING.
21.6
21.7    EXAMPLE-2-2.
21.8  *  The string passed in the array instring should
21.9  *  be scanned for the first occurrence of a special
22    *  character.  All characters before the first special
22.1  *  character are moved to outstring (same as EXAMPLE 2-1).
22.2  *  Set the while flag (bit 11 = 0) and all condition
22.3  *  flags except for special characters (bits 13 - 15 = 1).
22.4  *
22.5  *    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5  BITS
```

```
22.6  *    0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1  =   7(octal) =  7(dec.)
22.7  *
22.8  *  Note: The 'while flag' is set and all ending criteria
22.9  *        except for special characters are set.  Therefore, the
23    *        operation continues while an uppercase, a lowercase, or
23.1  *        a numeric character is found.  When a special
23.2  *        character is found, or the number of characters
23.3  *        contained in length is processed, the operation will
23.4  *        terminate.
23.5
23.6        MOVE SPACES  TO OUTSTRING.
23.7
23.8        MOVE 7       TO FLAGS.
23.9
24          CALL INTRINSIC "NLSCANMOVE" USING INSTRING,
24.1                                          OUTSTRING,
24.2                                          FLAGS,
24.3                                          LEN,
24.4                                          LANGNUM,
24.5                                          ERRORS,
24.6                                          CHARSET-TABLE,
24.7                                          UPSHIFT-TABLE
24.8                                    GIVING NUMCHAR.
24.9
25          IF ERR1 NOT EQUAL 0
25.1           COMPUTE QUITPARM = 8000 + ERR1
25.2           CALL INTRINSIC "QUIT" USING QUITPARM.
25.3
25.4        DISPLAY "SCAN/MOVE WHILE ALPHA OR NUM:  (EXAMPLE 2-2)".
25.5        DISPLAY OUTSTRING.
25.6
25.7   EXAMPLE-3-1.
25.8  *  The string passed in the array instring should be
25.9  *  scanned for the first occurrence of a special or numeric
26    *  character.  All characters before one of these characters
26.1  *  are moved to outstring and downshifted simultaneously.
26.2  *  Set the until flag (bit 11 = 1) and the ending condition
26.3  *  flags for special and numeric characters (bits 12-13 = 1).
26.4  *  To perform downshifting set bit 9 to 1.
26.5  *
26.6  *    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5  BITS
26.7  *    0 0 0 0 0 0 0 0 0 1 0 1 1 1 0 0  = 134(octal) = 92(dec.)
26.8  *
26.9  *  Note: The 'until flag' is set and the ending condition is
27    *        set to 'special character' and to 'numeric character'.
27.1  *        Therefore, the operation continues until the first
27.2  *        special or numeric character is found, or
27.3  *        until the number of characters contained in length
27.4  *        is processed.
27.5  *
27.6
27.7        MOVE SPACES  TO OUTSTRING.
27.8
27.9        MOVE 92      TO FLAGS.
28
28.1        CALL INTRINSIC "NLSCANMOVE" USING INSTRING,
```

```
28.2                                            OUTSTRING,
28.3                                            FLAGS,
28.4                                            LEN,
28.5                                            LANGNUM,
28.6                                            ERRORS,
28.7                                            CHARSET-TABLE,
28.8                                            DOWNSHIFT-TABLE
28.9                                    GIVING NUMCHAR.
29
29.1        IF ERR1 NOT EQUAL TO 0
29.2           COMPUTE QUITPARM = 9000 + ERR1
29.3           CALL INTRINSIC "QUIT" USING QUITPARM.
29.4
29.5        DISPLAY
29.6        "SCAN/MOVE/DOWNSHIFT UNTIL NUM. OR SPEC.:  (EXAMPLE 3-1)".
29.7        DISPLAY OUTSTRING.
29.8
29.9    EXAMPLE-3-2.
30      *   The string passed in the array instring should be
30.1    *   scanned for the first occurrence of a special or numeric
30.2    *   character.  All characters before one of these characters
30.3    *   are moved to outstring and downshifted simultaneously
30.4    *   (same as EXAMPLE-3-2).
30.5    *   Set the while flag (bit 11 = 0) and the condition
30.6    *   flags for upper and lower case characters (bits 14-15 = 1).
30.7    *   To perform downshifting set bit 9 to 1.
30.8    *
30.9    *     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5  BITS
31      *     0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 1  = 103(octal) = 67(dec.)
31.1    *
31.2    *   Note: The 'while flag' is set and the ending criteria for
31.3    *         upppercase and lowercase characters are set.
31.4    *         Therefore, the operation continues while an uppercase or
31.5    *         a lowercase character is found.  When a special
31.6    *         or a numeric character is found, or the number of
31.7    *         characters contained in length is processed, the
31.8    *         operation will terminate.
31.9
32          MOVE SPACES  TO OUTSTRING.
32.1
32.2        MOVE 67      TO FLAGS.
32.3
32.4        CALL INTRINSIC "NLSCANMOVE" USING INSTRING,
32.5                                          OUTSTRING,
32.6                                          FLAGS,
32.7                                          LEN,
32.8                                          LANGNUM,
32.9                                          ERRORS,
33                                            CHARSET-TABLE,
33.1                                          DOWNSHIFT-TABLE
33.2                                    GIVING NUMCHAR.
33.3
33.4        IF ERR1 NOT EQUAL 0
33.5           COMPUTE QUITPARM = 10000 + ERR1,
33.6           CALL INTRINSIC "QUIT" USING QUITPARM.
33.7
```

```
33.8        DISPLAY
33.9        "SCAN/MOVE/DOWNSHIFT WHILE ALPHA:  (EXAMPLE 3-2)".
34          DISPLAY OUTSTRING.
34.1
34.2        STOP RUN.
```

Executing the program results in the following:

```
:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
GERMAN
THE FOLLOWING STRING IS USED IN ALL EXAMPLES:
abCDfg6ijkaÆÄbøcGjGf1f$E!SAüÑdäeÉ1a23%&7a  123&i12fÆÄgøhklKLabCDASAüÑi
UPSHIFTED:  (EXAMPLE 1-1)
ABCDFG6IJKAÆÄBØCGJGF1F$E!SAÜÑDÄEÉ1A23%&7A  123&I12FÆÄGØHKLKLABCDASAÜÑI
UPSHIFTED:  (EXAMPLE 1-2)
ABCDFG6IJKAÆÄBØCGJGF1F$E!SAÜÑDÄEÉ1A23%&7A  123&I12FÆÄGØHKLKLABCDASAÜÑI
SCAN/MOVE  UNTIL SPECIAL:  (EXAMPLE 2-1)
abCDfg6ijkaÆÄbøcGjGf1f
SCAN/MOVE WHILE ALPHA OR NUM:  (EXAMPLE 2-2)
abCDfg6ijkaÆÄbøcGjGf1f
SCAN/MOVE/DOWNSHIFT UNTIL NUM. OR SPEC.:  (EXAMPLE 3-1)
abcdfg
SCAN/MOVE/DOWNSHIFT WHILE ALPHA:  (EXAMPLE 3-2)
abcdfg

END OF PROGRAM


:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
0
THE FOLLOWING STRING IS USED IN ALL EXAMPLES:
abCDfg6ijkaÆÄbøcGjGf1f$E!SAüÑdäeÉ1a23%&7a  123&i12fÆÄgøhklKLabCDASAüÑi
UPSHIFTED:  (EXAMPLE 1-1)
ABCDFG6IJKAÆÄBØCGJGF1F$E!SAÜÑDÄEÉ1A23%&7A  123&I12FÆÄGØHKLKLABCDASAÜÑI
UPSHIFTED:  (EXAMPLE 1-2)
ABCDFG6IJKAÆÄBØCGJGF1F$E!SAÜÑDÄEÉ1A23%&7A  123&I12FÆÄGØHKLKLABCDASAÜÑI
SCAN/MOVE  UNTIL SPECIAL:  (EXAMPLE 2-1)
abCDfg6ijka
SCAN/MOVE WHILE ALPHA OR NUM:  (EXAMPLE 2-2)
abCDfg6ijka
SCAN/MOVE/DOWNSHIFT UNTIL NUM. OR SPEC.:  (EXAMPLE 3-1)
abcdfg
SCAN/MOVE/DOWNSHIFT WHILE ALPHA:  (EXAMPLE 3-2)
abcdfg

END OF PROGRAM
:
```

G. Using The NLSCANMOVE Intrinsic In An SPL Program

In this program there are six different calls to NLSCANMOVE. In every call, parameters are passed to NLSCANMOVE. Since the upshift/downshift table and the character attributes table are optional parameters, they may be omitted. For performance reasons (if NLSCANMOVE is called frequently) they should be passed to the intrinsic after being read in by the appropriate calls to NLINFO.

```
1   $CONTROL USLINIT
2   BEGIN
3      LOGICAL ARRAY
4         L'UPSHIFT    (0:127),
5         L'DOWNSHIFT  (0:127),
6         L'CHARSET    (0:127),
7         L'ERROR      (0:1),
8         L'INSTRING   (0:34),
9         L'OUTSTRING  (0:34),
10        L'PRINT      (0:34),
11        L'LANGUAGE   (0:7);
12
13     BYTE ARRAY
14        B'INSTRING(*)    = L'INSTRING,
15        B'OUTSTRING(*)   = L'OUTSTRING,
16        B'PRINT(*)       = L'PRINT;
17
18     BYTE POINTER
19        BP'PRINT;
20
21     INTEGER
22        LANGNUM,
23        NUM'CHAR,
24        LGTH,
25        LENGTH;
26
27     LOGICAL
28        FLAGS;
29
30     DEFINE
31        LOWER'CASE      = FLAGS.(15:1)#,
32        UPPER'CASE      = FLAGS.(14:1)#,
33        NUMERIC'CHAR    = FLAGS.(13:1)#,
34        SPECIAL'CHAR    = FLAGS.(12:1)#,
35
36        WHILE'UNTIL     = FLAGS.(11:1)#,
37
38        UPSHIFT'FLAG    = FLAGS.(10:1)#,
39        DOWNSHIFT'FLAG  = FLAGS.(9:1)#,
40
41        ERROR'CHECK   = IF L'ERROR(0) <> 0 THEN
42                           QUIT #,
43
44        CCNE          = IF <> THEN
45                           QUIT #,
46
47        DISPLAY       = MOVE B'PRINT := #,
48
```

```
49          ON'STDLIST    = ,2;
50                          @BP'PRINT := TOS;
51                          LGTH := LOGICAL(@BP'PRINT) -
52                                  LOGICAL(@B'PRINT);
53                          PRINT(L'PRINT, -LGTH, 0) #;
54
55
56        INTRINSIC
57           READ,
58           QUIT,
59           PRINT,
60           NLINFO,
61           NLSCANMOVE;
62
63
64      << Start of main code.
65         Initializing the arrays.                                    >>
66
67         MOVE B'INSTRING
68                  := "abCDfg6ijkaÆÄbøcGjGf1f$E!SÄüÑdäeÉ1a23%&7",2;
69         MOVE  *  := "a  123&i12fÆÄgøhklKLabCDASÄüÑi";
70
71         MOVE L'OUTSTRING       := "  ";
72         MOVE L'OUTSTRING(1)    := L'OUTSTRING,(39);
73
74         MOVE L'LANGUAGE        := "  ";
75         MOVE L'LANGUAGE(1)     := L'LANGUAGE,(7);
76
77      << The user is asked to enter a language name or number.      >>
78
79         DISPLAY
80            "ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):"
81         ON'STDLIST;
82
83         READ(L'LANGUAGE,-16);
84
85      << NLINFO item 22 returns the corresponding language
86         number in integer format for this language.                 >>
87
88         NLINFO(22,L'LANGUAGE,LANGNUM,L'ERROR);
89         IF L'ERROR(0) <> 0 THEN
90            BEGIN
91               IF L'ERROR(0) = 1 THEN
92                  BEGIN
93                     DISPLAY
94                     "NL/3000 IS NOT INSTALLED"
95                     ON'STDLIST;
96                     QUIT (1001);
97                  END
98               ELSE
99                  IF L'ERROR(0) = 2 THEN
100                    BEGIN
101                       DISPLAY
102                       "THIS LANGUAGE IS NOT CONFIGURED"
103                       ON'STDLIST;
104                       QUIT (1002);
```

```
105                END
106             ELSE
107                QUIT (1000 + L'ERROR(0));
108       END;
109
110
111   << Obtain the character attributes table using
112      NLINFO item 12.                                              >>
113
114      NLINFO(12,L'CHARSET,LANGNUM,L'ERROR);
115      ERROR'CHECK (2000 + L'ERROR(0));
116
117   << Obtain the upshift table using NLINFO item 15.               >>
118
119      NLINFO(15,L'UPSHIFT,LANGNUM,L'ERROR);
120      ERROR'CHECK (3000 + L'ERROR(0));
121
122   << Obtain the downshift table using NLINFO item 16.             >>
123
124      NLINFO(16,L'DOWNSHIFT,LANGNUM,L'ERROR);
125      ERROR'CHECK (4000 + L'ERROR(0));
126
127   << Print the character string used in all examples(instring).   >>
128
129      DISPLAY
130         "THE FOLLOWING STRING IS USED IN ALL EXAMPLES:"
131      ON'STDLIST;
132      DISPLAY B'INSTRING,(70) ON'STDLIST;
133
134   EXAMPLE'1'1:
135   << The string passed in the array instring is moved and
136      UPSHIFTED to the array outstring.
137      Note: The 'until flag' is set.  Therefore, the operation
138            continues until one of the ending criteria is true.
139            If no ending condition was set the
140            operation continues for the number of characters
141            contained in length.                                   >>
142
143      LENGTH          := 70;
144
145      FLAGS           := 0;
146
147      WHILE'UNTIL     := 1;
148      UPSHIFT'FLAG    := 1;
149
150      NUM'CHAR := NLSCANMOVE(B'INSTRING, B'OUTSTRING, FLAGS,
151                  LENGTH, LANGNUM, L'ERROR, L'CHARSET, L'UPSHIFT);
152      ERROR'CHECK (5000 + L'ERROR(0));
153
154      DISPLAY "UPSHIFTED:  (EXAMPLE 1-1)" ON'STDLIST;
155      DISPLAY B'OUTSTRING,(NUM'CHAR) ON'STDLIST;
156
157   EXAMPLE'1'2:
158   << Note: The 'while flag' is set.  Therefore, the operation will
159            continue while one of the end criteria is true.  Since
160            all conditions are set, one of them will be always
```

```
161           true and the operation continues for the number of
162           characters contained in length.  This example performs
163           the same operation as EXAMPLE 1-1.                    >>
164
165       MOVE L'OUTSTRING      := "  ";
166       MOVE L'OUTSTRING(1)   := L'OUTSTRING,(39);
167
168       FLAGS           := 0;
169
170       LOWER'CASE      := 1;
171       UPPER'CASE      := 1;
172       SPECIAL'CHAR    := 1;
173       NUMERIC'CHAR    := 1;
174
175       WHILE'UNTIL     := 0;
176       UPSHIFT'FLAG    := 1;
177
178       NUM'CHAR := NLSCANMOVE(B'INSTRING, B'OUTSTRING, FLAGS,
179                   LENGTH, LANGNUM, L'ERROR, L'CHARSET, L'UPSHIFT);
180       ERROR'CHECK (6000 + L'ERROR(0));
181
182       DISPLAY "UPSHIFTED:  (EXAMPLE 1-2)" ON'STDLIST;
183       DISPLAY B'OUTSTRING,(NUM'CHAR) ON'STDLIST;
184
185   EXAMPLE'2'1:
186   << The string contained in instring should be scanned for the
187      first occurrence of a special character.  All characters
188      before the first special are moved to outstring.
189      Note: The 'until flag' is set and the ending condition is
190            set to 'special character'.  Therefore, the operation
191            continues until the first special character is found or
192            until the number of characters contained in length
193            is processed.                                         >>
194
195
196       MOVE L'OUTSTRING      := "  ";
197       MOVE L'OUTSTRING(1)   := L'OUTSTRING,(39);
198
199       FLAGS           := 0;
200
201       SPECIAL'CHAR    := 1;
202
203       WHILE'UNTIL     := 1;
204       UPSHIFT'FLAG    := 0;
205
206       NUM'CHAR := NLSCANMOVE(B'INSTRING, B'OUTSTRING, FLAGS,
207                   LENGTH, LANGNUM, L'ERROR, L'CHARSET, L'UPSHIFT);
208       ERROR'CHECK (7000 + L'ERROR(0));
209
210       DISPLAY "SCAN/MOVE  UNTIL SPECIAL:  (EXAMPLE 2-1)"
211       ON'STDLIST;
212       DISPLAY B'OUTSTRING,(NUM'CHAR) ON'STDLIST;
213
214   EXAMPLE'2'2:
215   << Note: The 'while flag' is set and all ending criteria
216            except for special characters are set.  Therefore, the
```

```
217           operation continues while an uppercase, a lowercase, or
218           a numeric character is found.  When a special
219           character is found or the number of characters
220           contained in length is processed, the operation will
221           terminate.
222           This is the same operation as in EXAMPLE 2-1.          >>
223
224       MOVE L'OUTSTRING      := "  ";
225       MOVE L'OUTSTRING(1)   := L'OUTSTRING,(39);
226
227       FLAGS           := 0;
228
229       LOWER'CASE      := 1;
230       UPPER'CASE      := 1;
231       SPECIAL'CHAR    := 0;
232       NUMERIC'CHAR    := 1;
233
234       WHILE'UNTIL     := 0;
235       UPSHIFT'FLAG    := 0;
236
237       NUM'CHAR := NLSCANMOVE(B'INSTRING, B'OUTSTRING, FLAGS,
238                   LENGTH, LANGNUM, L'ERROR, L'CHARSET, L'UPSHIFT);
239       ERROR'CHECK (8000 + L'ERROR(0));
240
241       DISPLAY "SCAN/MOVE WHILE ALPHA OR NUM:  (EXAMPLE 2-2)"
242       ON'STDLIST;
243       DISPLAY B'OUTSTRING,(NUM'CHAR) ON'STDLIST;
244
245   EXAMPLE'3'1:
246   << The data contained in instring should be scanned for the
247      first occurrence of a numeric or a special character.
248      All characters preceding the first special or numeric character
249      are moved to outstring.
250      Note: The 'until flag' is set and the ending conditions are
251            set to 'special character' and to 'numeric character'.
252            Therefore, the operation runs until the first
253            special or numeric character is found, or
254            until the number of characters contained in length
255            is processed.                                          >>
256
257
258       MOVE L'OUTSTRING      := "  ";
259       MOVE L'OUTSTRING(1)   := L'OUTSTRING,(39);
260
261       FLAGS           := 0;
262
263       SPECIAL'CHAR    := 1;
264       NUMERIC'CHAR    := 1;
265
266       WHILE'UNTIL     := 1;
267       DOWNSHIFT'FLAG  := 1;
268
269       NUM'CHAR := NLSCANMOVE(B'INSTRING, B'OUTSTRING, FLAGS,
270                   LENGTH, LANGNUM, L'ERROR, L'CHARSET, L'DOWNSHIFT);
271       ERROR'CHECK (9000 + L'ERROR(0));
272
```

```
273       DISPLAY
274       "SCAN/MOVE/DOWNSHIFT UNTIL NUM. OR SPEC.:  (EXAMPLE 3-1)"
275       ON'STDLIST;
276       DISPLAY B'OUTSTRING,(NUM'CHAR) ON'STDLIST;
277
278    EXAMPLE'3'2:
279    << Note: The 'while flag' is set and the ending criteria for
280             upppercase and lowercase characters are set.
281             Therefore, the operation continues while an uppercase or
282             a lowercase character is found.  When a special
283             or numeric character is found or the number of
284             characters contained in length is processed, the
285             operation will terminate.
286             This is the same operation as in EXAMPLE 3-1.          >>
287
288       MOVE L'OUTSTRING      := "  ";
289       MOVE L'OUTSTRING(1)   := L'OUTSTRING,(39);
290
291       FLAGS           := 0;
292
293       LOWER'CASE      := 1;
294       UPPER'CASE      := 1;
295
296       WHILE'UNTIL     := 0;
297       DOWNSHIFT'FLAG  := 1;
298
299       NUM'CHAR := NLSCANMOVE(B'INSTRING, B'OUTSTRING, FLAGS,
300                 LENGTH, LANGNUM, L'ERROR, L'CHARSET, L'DOWNSHIFT);
301       ERROR'CHECK (1000 + L'ERROR(0));
302
303       DISPLAY
304       "SCAN/MOVE/DOWNSHIFT WHILE ALPHA:  (EXAMPLE 3-2)"
305       ON'STDLIST;
306       DISPLAY B'OUTSTRING,(NUM'CHAR) ON'STDLIST;
307
308    END.
```

Executing the program results in the following:

```
:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
GERMAN
THE FOLLOWING STRING IS USED IN ALL EXAMPLES:
abCDfg6ijkaÆÄbøcGjGf1f$E!SÄüÑdäeÉ1a23%&7a  123&i12fÆÄgøhklKLabCDASÄüÑi
UPSHIFTED:  (EXAMPLE 1-1)
ABCDFG6IJKAÆÄBØCGJGF1F$E!SÄÜÑDÄEÉ1A23%&7A  123&I12FÆÄGØHKLKLABCDASÄÜÑI
UPSHIFTED:  (EXAMPLE 1-2)
ABCDFG6IJKAÆÄBØCGJGF1F$E!SÄÜÑDÄEÉ1A23%&7A  123&I12FÆÄGØHKLKLABCDASÄÜÑI
SCAN/MOVE  UNTIL SPECIAL:  (EXAMPLE 2-1)
abCDfg6ijkaÆÄbøcGjGf1f
SCAN/MOVE WHILE ALPHA OR NUM:  (EXAMPLE 2-2)
abCDfg6ijkaÆÄbøcGjGf1f
SCAN/MOVE/DOWNSHIFT UNTIL NUM. OR SPEC.:  (EXAMPLE 3-1)
abcdfg
```

```
SCAN/MOVE/DOWNSHIFT WHILE ALPHA:  (EXAMPLE 3-2)
abcdfg

END OF PROGRAM

:RUN PROGRAM

ENTER A LANGUAGE NAME OR NUMBER (MAX. 16 CHARACTERS):
NATIVE-3000
THE FOLLOWING STRING IS USED IN ALL EXAMPLES:
abCDfg6ijkaÆÄbøcGjGf1f$E!SÅüÑdäeÉ1a23%&7a  123&i12fÆÄgøhklKLabCDASÅüÑi
UPSHIFTED:  (EXAMPLE 1-1)
ABCDFG6IJKAÆÄBøCGJGF1F$E!SÅüÑDäEÉ1A23%&7A  123&I12FÆÄGøHKLKLABCDASÅüÑI
UPSHIFTED:  (EXAMPLE 1-2)
ABCDFG6IJKAÆÄBøCGJGF1F$E!SÅüÑDäEÉ1A23%&7A  123&I12FÆÄGøHKLKLABCDASÅüÑI
SCAN/MOVE  UNTIL SPECIAL:  (EXAMPLE 2-1)
abCDfg6ijka
SCAN/MOVE WHILE ALPHA OR NUM:  (EXAMPLE 2-2)
abCDfg6ijka
SCAN/MOVE/DOWNSHIFT UNTIL NUM. OR SPEC.:  (EXAMPLE 3-1)
abcdfg
SCAN/MOVE/DOWNSHIFT WHILE ALPHA:  (EXAMPLE 3-2)
abcdfg

END OF PROGRAM
:
```

H. Using The NLTRANSLATE/NLREPCHAR Intrinsics In A COBOLII Program

The string used in the example is 256 bytes in length and contains all possible byte values from 0 to 255. This string is converted from USASCII to EBCDIC. Then the converted string is taken and translated back to USASCII. This is done according to the ASCII-to-EBCDIC and EBCDIC-to-ASCII translation tables corresponding to the entered language.

Afterwards this twice-translated string is displayed. All characters which are non-printable (control and undefined characters) in the character set supporting the given language are replaced by a period before the string is displayed, by calling NLREPCHAR intrinsic.

```
1   $CONTROL USLINIT
1.1  IDENTIFICATION DIVISION.
1.2      PROGRAM-ID. EXAMPLE.
1.3      AUTHOR. LORO.
1.4  ENVIRONMENT DIVISION.
1.5  DATA DIVISION.
1.6  WORKING-STORAGE SECTION.
1.7     77       QUITNUM                    PIC S9(4) COMP VALUE 0.
1.8     77       LANGNUM                    PIC S9(4) COMP VALUE 0.
1.9     77       IND                        PIC S9(4) COMP VALUE 0.
2
2.1     01       TABLES.
2.2       05     USASCII-EBC-TABLE            PIC X(256) VALUE SPACES.
2.3       05     EBC-USASCII-TABLE            PIC X(256) VALUE SPACES.
2.4       05     CHARSET-TABLE              PIC X(256) VALUE SPACES.
2.5
2.6     01       BUFFER-FIELDS.
2.7       05     INT-FIELD                  PIC S9(4) COMP VALUE -1.
2.8       05     BYTE-FIELD REDEFINES INT-FIELD.
2.9         10   FILLER                     PIC X.
3           10   CHAR                       PIC X.
3.1
3.2     01       STRINGS.
3.3       05     LANGUAGE                   PIC X(16)  VALUE SPACES.
3.4       05     IN-STRING.
3.5         10   IN-BYTE                    PIC X OCCURS 256.
3.6       05     OUT-STRING.
3.7         10   OUT-STR1                   PIC X(80).
3.8         10   OUT-STR2                   PIC X(80).
3.9         10   OUT-STR3                   PIC X(80).
4           10   OUT-STR4                   PIC X(16).
4.1
4.2     01       REPLACE-WORD               PIC S9(4) COMP VALUE 0.
4.3     01       REPLACE-BYTES REDEFINES REPLACE-WORD.
4.4       05     REPLACEMENT-CHAR           PIC X.
4.5       05     FILLER                     PIC X.
4.6
4.7     01       ERRORS.
4.8       05     ERR1                       PIC S9(4) COMP.
4.9       05     ERR2                       PIC S9(4) COMP.
5    PROCEDURE DIVISION.
5.1  START-PGM.
5.2 * Initialize the instring array with all possible
```

```
5.3 * byte values starting from binary zero until 255.
5.4       MOVE -1 TO INT-FIELD.
5.5       PERFORM FILL-INSTRING VARYING IND FROM 1 BY 1
5.6               UNTIL IND > 256.
5.7       GO TO GET-LANGUAGE.
5.8
5.9  FILL-INSTRING.
6         ADD 1       TO INT-FIELD.
6.1       MOVE CHAR   TO IN-BYTE(IND).
6.2
6.3  GET-LANGUAGE.
6.4 *The language is hard-coded, set to 8 (GERMAN).
6.5
6.6       MOVE 8      TO LANGNUM.
6.7
6.8  GET-THE-TABLES.
6.9 * Call the USASCII-EBCDIC and EBCDIC-USASCII
7   * conversion tables and the character attribute table
7.1 * by using the appropriate NLINFO items.
7.2 * NOTE: NLTRANSLATE and NLREPCHAR may be called without
7.3 *       passing the tables (last parameter).  For performance
7.4 *       reasons the tables should be passed, if these
7.5 *       intrinsics are called very often.
7.6
7.7       CALL INTRINSIC "NLINFO" USING 13,
7.8                                     USASCII-EBC-TABLE,
7.9                                     LANGNUM,
8                                       ERRORS.
8.1       IF ERR1 NOT EQUAL 0
8.2          COMPUTE QUITNUM = 1000 + ERR1,
8.3          CALL INTRINSIC "QUIT" USING QUITNUM.
8.4
8.5       CALL INTRINSIC NLINFO ITEM 14,
8.6                                     EBC-USASCII-TABLE,
8.7                                     LANGNUM,
8.8                                     ERRORS.
8.9       IF ERR1 NOT EQUAL 0
9            COMPUTE QUITNUM = 2000 + ERR1,
9.1          CALL INTRINSIC "QUIT" USING QUITNUM.
9.2       CALL INTRINSIC "NLINFO" USING 12,
9.3                                     CHARSET-TABLE,
9.4                                     LANGNUM,
9.5                                     ERRORS.
9.6       IF ERR1 NOT EQUAL 0
9.7          COMPUTE QUITNUM = 3000 + ERR1,
9.8          CALL INTRINSIC "QUIT" USING QUITNUM.
9.9
10    CONVERT-ASC-EBC.
10.1 * Convert IN-STRING from USASCII into EBCDIC by
10.2 * using NLTRANSLATE code 2. The converted string will
10.3 * be in OUT-STRING.
10.4
10.5      CALL INTRINSIC "NLTRANSLATE" USING 2,
10.6                                         IN-STRING,
10.7                                         OUT-STRING,
10.8                                         256,
```

```
10.9                                        LANGNUM,
11                                          ERRORS,
11.1                                        USASCII-EBC-TABLE.
11.2       IF ERR1 NOT EQUAL 0
11.3          COMPUTE QUITNUM = 4000 + ERR1,
11.4          CALL INTRINSIC "QUIT" USING QUITNUM.
11.5
11.6   CONVERT-EBC-ASC.
11.7  * Convert OUT-STRING back from EBCDIC to USASCII by
11.8  * using NLTRANSLATE code 1. The retranslated string will
11.9  * be in IN-STRING again.
12
12.1       CALL INTRINSIC "NLTRANSLATE" USING 1,
12.2                                          OUT-STRING,
12.3                                          IN-STRING,
12.4                                          256,
12.5                                          LANGNUM,
12.6                                          ERRORS,
12.7                                          EBC-USASCII-TABLE.
12.8       IF ERR1 NOT EQUAL 0
12.9          COMPUTE QUITNUM = 5000 + ERR1,
13            CALL INTRINSIC "QUIT" USING QUITNUM.
13.1
13.2   REPLACE-NON-PRINTABLES.
13.3  * Replace all non-printable characters
13.4  * in IN-STRING and display the string.
13.5
13.6       MOVE "." TO REPLACEMENT-CHAR.
13.7       CALL INTRINSIC "NLREPCHAR" USING IN-STRING,
13.8                                          IN-STRING,
13.9                                          256,
14                                            REPLACE-WORD,
14.1                                          LANGNUM,
14.2                                          ERRORS.
14.3       IF ERR1 NOT EQUAL 0
14.4          COMPUTE QUITNUM = 6000 + ERR1,
14.5          CALL INTRINSIC "QUIT" USING QUITNUM.
14.6
14.7       DISPLAY "IN-STRING:"
14.8       DISPLAY IN-STRING.
14.9       STOP RUN.
```

I. Using The NLKEYCOMPARE Intrinsic In A COBOLII Program

The example shows a new KSAM file built programmatically. This new KSAM file is built with a language attribute. This means the keys will be sorted according to the collating sequence of this language. After building the file,the program writes 15 hard-coded data records into it.

Perform a generic FFINDBYKEY with a partial key of *length1* containing "E". This should position the KSAM file pointer to the first record whose key starts with any kind of "E" (e, E, è, é, etc.).

After locating this record, read all subsequent records in the file sequentially and call NLKEYCOMPARE to check whether the key found is what was requested. If the result returned by NLKEYCOMPARE is 3, the program is done. There are no more records whose key starts with any kind of "E".

```
1     $CONTROL USLINIT
1.1    IDENTIFICATION DIVISION.
1.2        PROGRAM-ID. EXAMPLE.
1.3        AUTHOR. LORO.
1.4    ENVIRONMENT DIVISION.
1.5    CONFIGURATION SECTION.
1.6    SOURCE-COMPUTER. HP3000.
1.7    OBJECT-COMPUTER. HP3000.
1.8    SPECIAL-NAMES.
1.9        CONDITION-CODE IS CC.
2      DATA DIVISION.
2.1    WORKING-STORAGE SECTION.
2.2       77       QUITNUM                PIC S9(4) COMP VALUE 0.
2.3       77       LANGNUM                PIC S9(4) COMP VALUE 0.
2.4       77       LEGTH                  PIC S9(4) COMP VALUE 0.
2.5       77       FNUM                   PIC S9(4) COMP VALUE 0.
2.6       77       RESULT                 PIC S9(4) COMP VALUE 0.
2.7       77       FOPTIONS               PIC S9(4) COMP.
2.8       77       AOPTIONS               PIC S9(4) COMP.
2.9       77       IND                    PIC S9(4) COMP.
3
3.1       01       TABLES.
3.2         05     COLL-TABLE             PIC X(800).
3.3         05     KSAM-PARAM.
3.4           10   KEY-FILE               PIC X(8) VALUE SPACES.
3.5           10   KEY-FILE-SIZ           PIC S9(8) COMP.
3.6           10   FILLER                 PIC X(8) VALUE SPACES.
3.7           10   LANGUAGE-NUM           PIC S9(4) COMP.
3.8           10   FILLER                 PIC X(8) VALUE SPACES.
3.9           10   FLAGWORD               PIC S9(4) COMP.
4             10   NUM-OF-KEYS            PIC S9(4) COMP.
4.1           10   KEY-DESCR              PIC S9(4) COMP.
4.2           10   KEY-LOCATION           PIC S9(4) COMP.
4.3           10   DUPL-BLOCK             PIC S9(4) COMP.
4.4           10   FILLER                 PIC X(20).
4.5
4.6       01       STRINGS.
4.7         05     GEN-KEY                PIC X(4).
4.8         05     FILENAME               PIC X(8) VALUE SPACES.
4.9
5         01       ERRORS.
```